

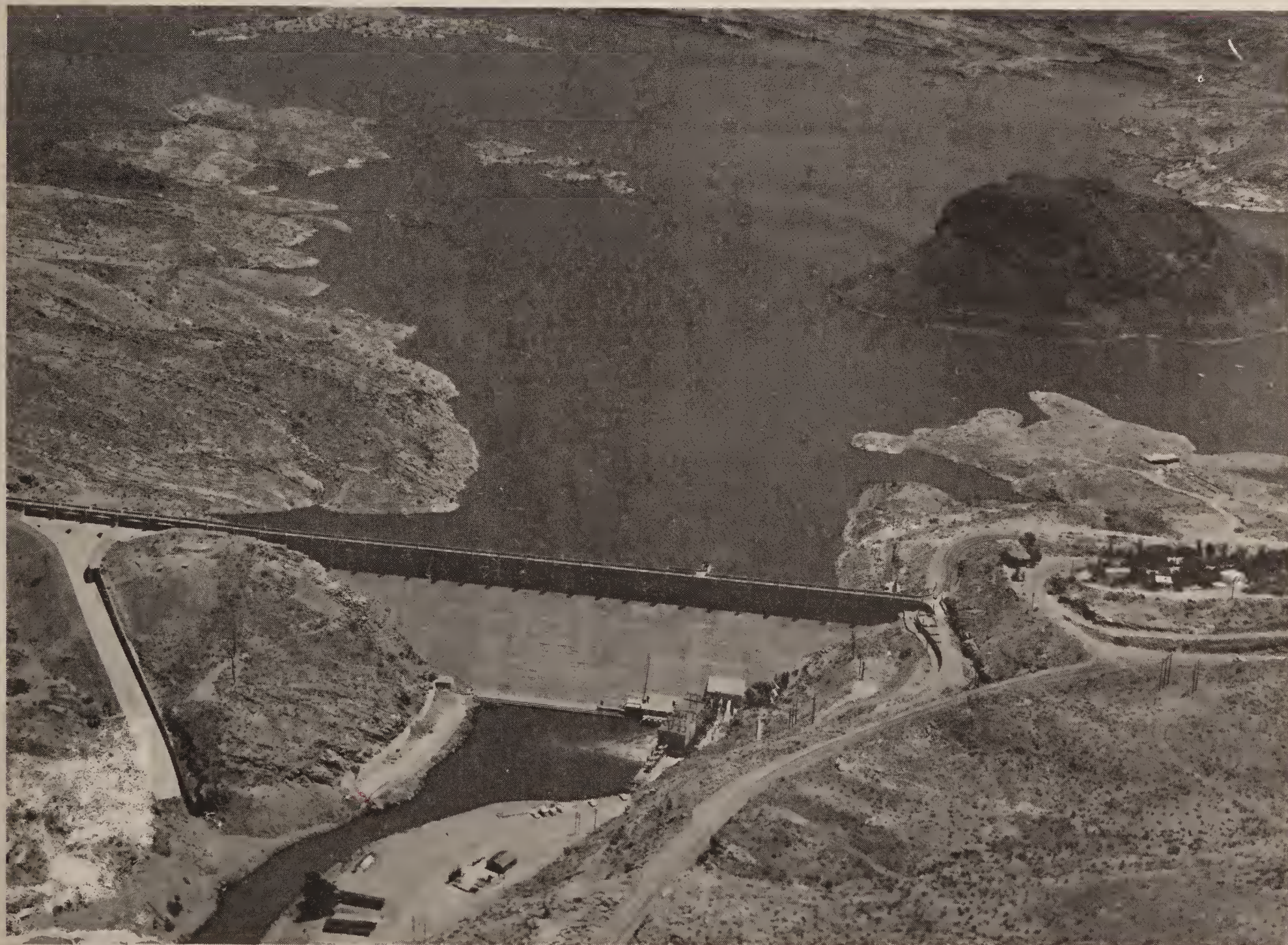


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Soil  
Conservation  
Service

In cooperation with  
United States  
Department of  
the Interior,  
Bureau of Land  
Management, and  
New Mexico  
Agricultural  
Experiment Station

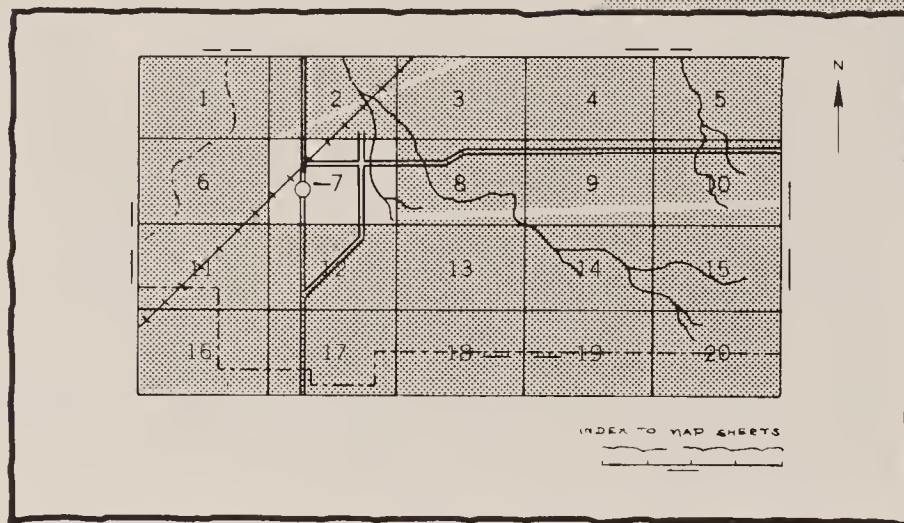
# Soil Survey of Sierra County Area, New Mexico





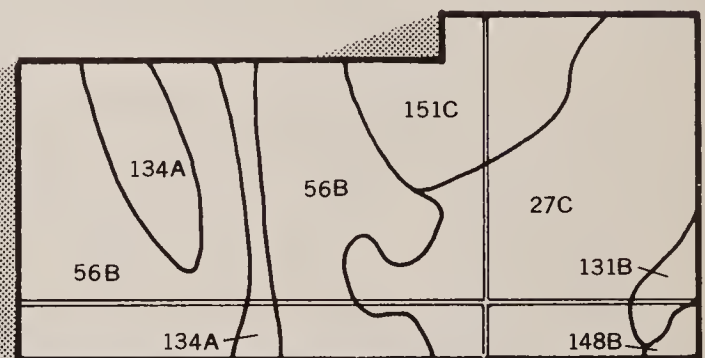
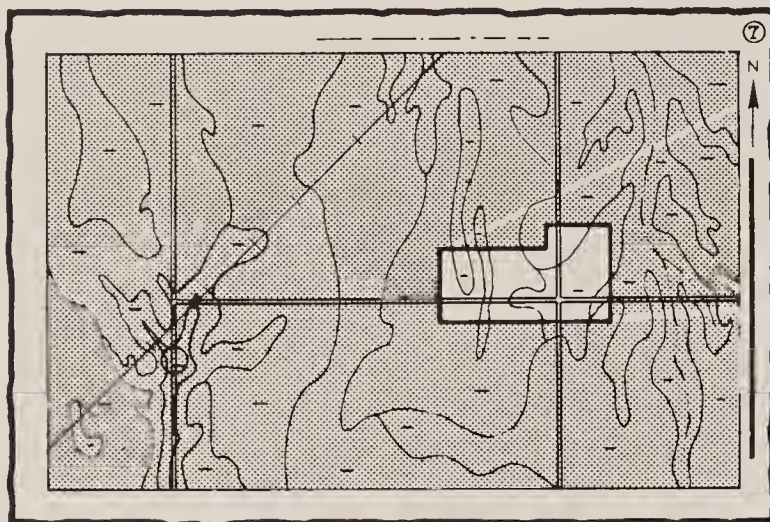
# HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

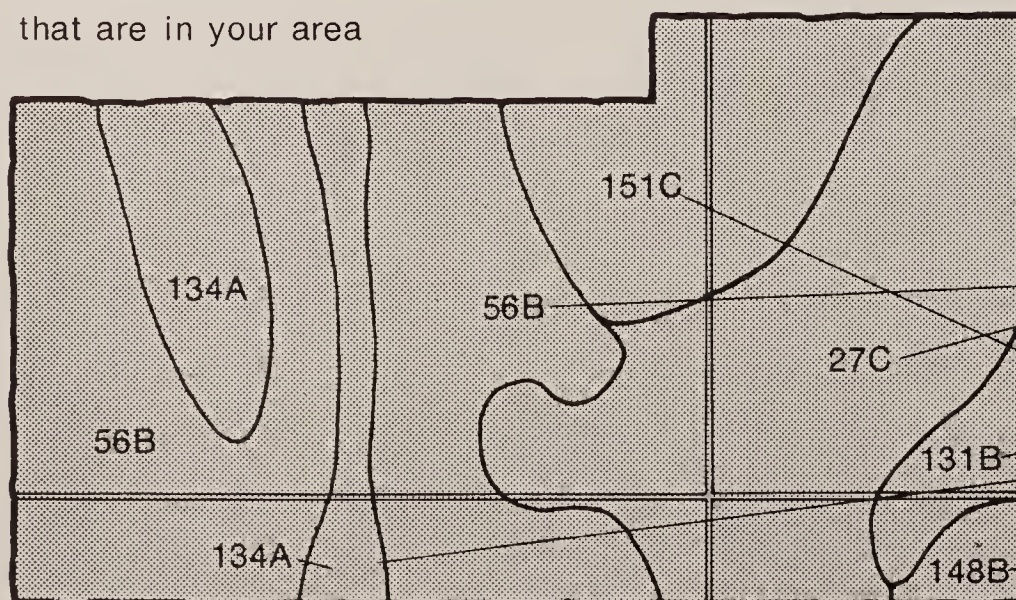


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area



## Symbols

27C

56B

131B

134A

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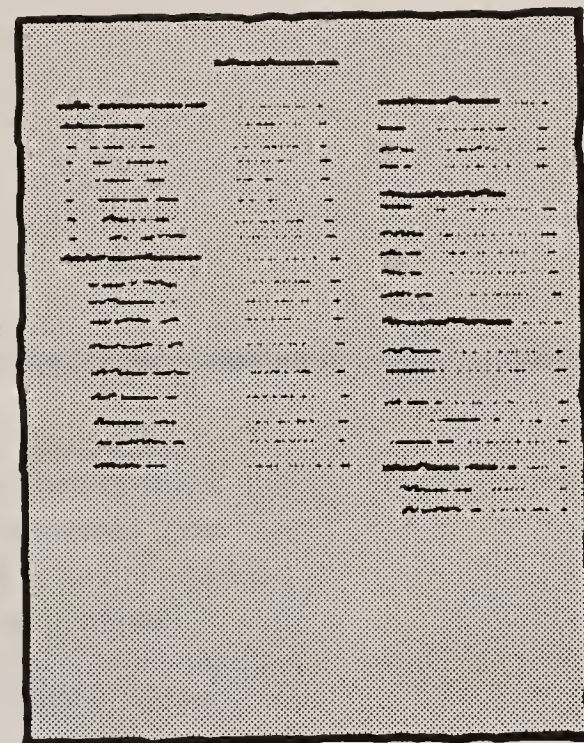
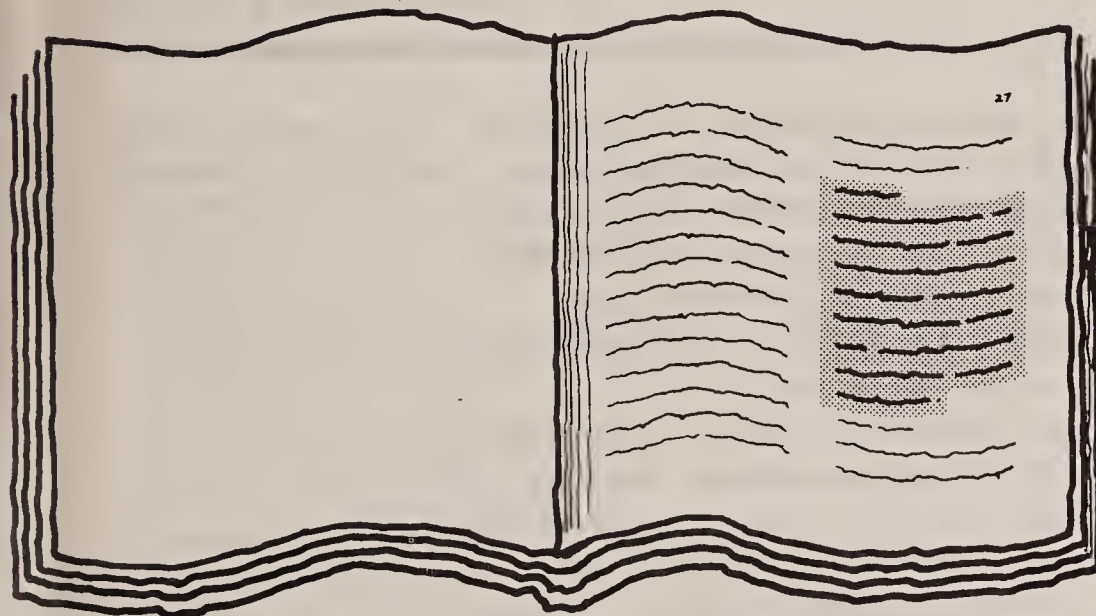
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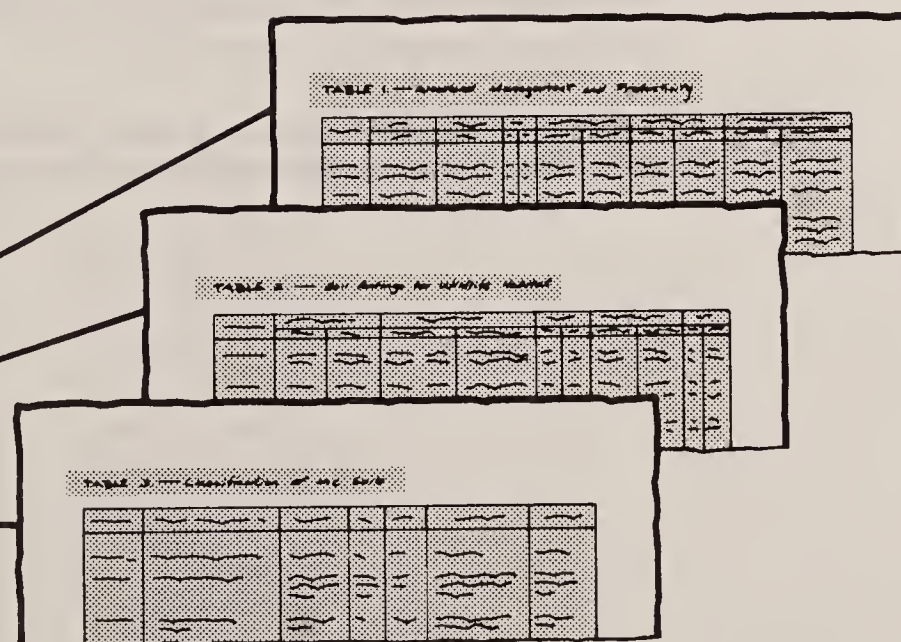
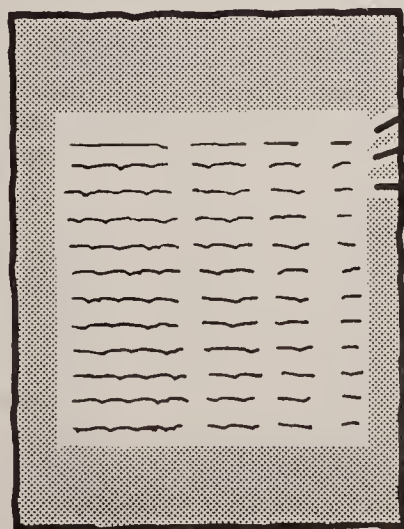
# THIS SOIL SURVEY

Turn to "Index to Soil Map Units"

which lists the name of each map unit and the page where that map unit is described.



See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

7.



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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1981. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Land Management, and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the Caballo and Sierra Soil and Water Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

**Cover: Elephant Butte Reservoir stores water for irrigation, recreation, and electricity. Runoff into the lake is from the Rio Grande Watershed.**



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# Foreword

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This soil survey contains information that can be used in land-planning programs in Sierra County Area, New Mexico. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

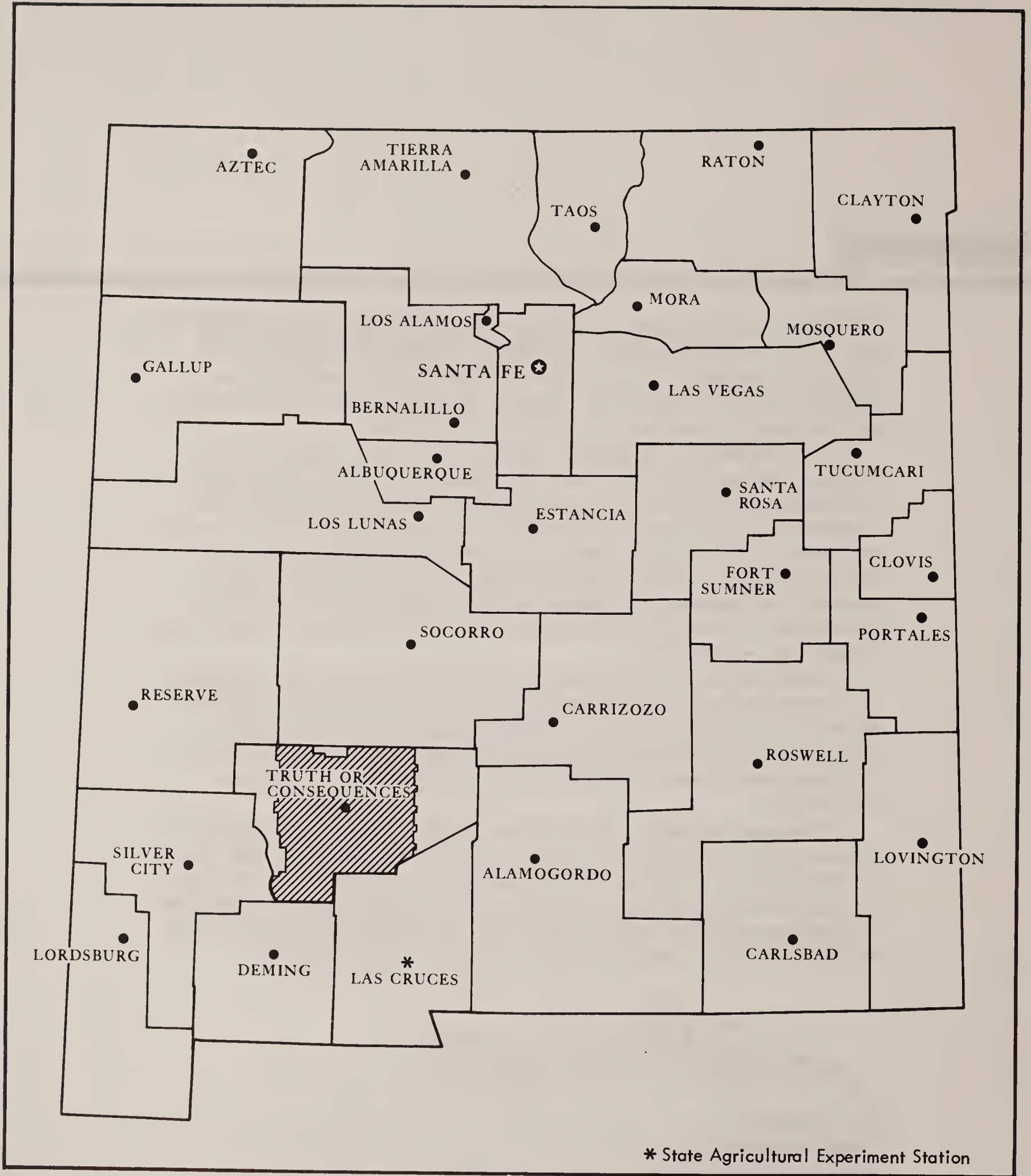
Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Additional information and help in using this publication are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Ray T. Margo Jr.  
State Conservationist  
Soil Conservation Service





Location of Sierra County Area in New Mexico.



# Soil Survey of Sierra County Area, New Mexico

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By Raymond E. Neher, Soil Conservation Service

Fieldwork by Raymond E. Neher, Dwayne Williams,  
and Kenneth Scheffe, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,  
in cooperation with  
United States Department of the Interior, Bureau of Land Management, and  
New Mexico Agricultural Experiment Station

SIERRA COUNTY AREA, NEW MEXICO, is in the south-central part of New Mexico. It has a total area of 1,927,489 acres, or about 3,012 square miles.

This survey area is bordered on the north by Socorro County, on the east by the White Sands Missile Range, on the south by Dona Ana and Luna Counties, and on the west by Grant County and the Gila National Forest.

Truth or Consequences, the county seat of Sierra County, is on the Rio Grande near the center of the survey area. The population of the survey area is about 8,457 (6).

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent soil survey areas. Differences are the result of better knowledge of soils, development of the soil classification system, modification in series concepts, intensity of mapping, or the extent of soils within the survey area.

## General Nature of the Survey Area

This section provides general information about the survey area. It discusses climate; natural resources; physiography, relief, and drainage; land use; history and development; and water for irrigation.

## Climate

By Frank E. Houghton, climatologist for New Mexico, National Weather Service, U.S. Department of Commerce.

The survey area has an arid, continental climate except in the mountainous western portion, which is semiarid. Characteristics of the predominant climate are low rainfall, wide diurnal and annual temperature ranges, low relative humidity, and plentiful sunshine. Summer is the rainy season, with half the annual precipitation falling during brief but sometimes heavy thunderstorms. In the warmest 6 months, May through October, 75 percent of the average annual precipitation occurs. The main source of moisture is air from over the Gulf of Mexico. Winter precipitation falls mainly from Pacific Ocean storms moving eastward. Winter precipitation is generally light because much of the moisture is removed as the air passes over the mountains west of New Mexico.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Elephant Butte Dam in the period 1897 to 1979.

Average annual precipitation in the Rio Grande Valley is 7 to 8 inches. Precipitation generally increases with elevation to average annual amounts of 15 to 20 inches in the mountains. There is a wide variation in precipitation from year to year and from month to month. At Kingston, 25.30 inches fell in 1916 and 11.72 inches in 1948. At Elephant Butte Dam, 16.70 inches fell in 1941 and only 3.53 inches in 1917. The greatest one-month precipitation, 8.09 inches, fell at Kingston in



August, 1916, and at Parks Ranch in July, 1914. Less than 1 inch of rain has fallen in some summer months. The greatest one-day precipitation, 6.35 inches, fell at Hermosa on August 31, 1925. The average number of days with 0.10 inch or more precipitation ranges from 15 at Truth or Consequences to 54 at McCauley Ranch, and the average number of days with 0.50 inch or more of precipitation ranges from 1 to 3 along the valley to 9 at McCauley Ranch.

Average annual snowfall ranges from only a few inches in the Rio Grande Valley, where it seldom remains on the ground for more than a few hours, to between 2 and 3 feet in the mountain areas. The season for snowfall is generally November through March.

Average annual temperatures range from 61 degrees F at Caballo Dam to 53 degrees at Winston. The highest temperature, 109 degrees, was recorded at Elephant Butte Dam on June 27 and 28, 1924, and at Caballo Dam on July 13, 1958. The lowest temperature, -23 degrees, was recorded at Winston on January 5, 1971. The average annual number of days with temperatures of 90 degrees or higher ranges from 34 at Winston to 108 at Caballo Dam. Only an occasional day reaches 100 degrees. The average number of days with freezing temperatures ranges from 162 days at Winston to 82 days at Elephant Butte Dam. Days with zero temperature are rare in the valley. Diurnal temperatures vary 27 degrees, resulting in generally mild days and cool nights throughout the year. The frost-free period in the valley is April through October, or about 220 days. Above 5,000 feet, the frost-free period is generally about 1 month less.

Sunshine occurs an average of nearly 3,500 hours a year, or nearly 80 percent of the possible hours. The percentage is fairly evenly distributed throughout the year, but it is slightly lower in winter. Average relative humidity at Engle Airport ranges from 63 percent early in the morning to 34 percent in most afternoons, with afternoons in May averaging 21 percent. Evaporation from a pan at Elephant Butte Dam averages 118 inches annually, or 92 inches during the frost-free period. The May through October average is 79 inches. Winds at Truth or Consequences Airport average 11 miles per hour annually, ranging from 13 miles per hour in spring to 10 miles per hour in summer and fall. Winds are calm about 4 percent of the year and are more than 24 miles per hour 5 percent of the year. Prevailing winds range from northwest to southwest. The strongest winds most frequently are from the southwest. Surface wind direction is influenced by the orientation of the valley, and topography in other sections of the survey area may cause local variations in wind direction and velocity.

## Natural Resources

The main natural resources in the survey area are soil, water, and copper. Crops produced on farms and cattle

that graze the rangeland are marketable products. Water for irrigation, industry, municipalities, and recreation is supplied by the Rio Grande, Alamosa, Cuchillo Negro, and Palomas Rivers; Las Animas and Percha Creeks; and Elephant Butte and Caballo Reservoirs. Water is diverted from these reservoirs to generate electricity and to use for irrigation and municipalities. Wells supplement water for irrigation and supply water for some rural areas. In addition, wells and livestock watering ponds supply water for livestock.

Copper mining is being developed along the west side of the area near Hillsboro.

## Physiography, Relief, and Drainage

The Rio Grande River, which is the major drainageway in the area, flows generally in a north to south direction through the central part of the survey area. Except for a small area in the extreme southwestern part that drains into the closed Mimbres Basin, all surface runoff from the western part of the area drains into the Rio Grande River. Most of the runoff in the eastern part drains into the Jornada del Muerto, a closed basin. East of the Rio Grande River, only the small areas immediately adjacent to the river are a part of its drainage system.

The survey area has varied landscapes and a wide range in relief. The extreme western and eastern parts are mountainous, with elevations ranging from about 5,500 feet in the foothills to more than 8,000 feet on mountain peaks. The elevations in much of the mountainous area range from 6,000 to 7,500 feet.

A rough and broken type of topography prevails, including steep and very steep mountainsides and canyonsides. The mountainous foothill areas are dominated by rolling to hilly and steep topography intermingled with gently sloping to strongly sloping, narrow valley bottoms and small areas of gently sloping and rolling uplands and ridgetops.

The areas between the mountainous western part of the area and the Rio Grande consist generally of moderately sloping to steeply sloping alluvial fans that are dissected by numerous drainageways. Areas between drainageways are characterized by broad, nearly level to gently sloping landscapes commonly referred to as mesas.

The eastern part of the area is dominated by gently sloping to strongly sloping plains, mountain ranges, and isolated mountains. The steep and rugged mountain ranges that rise abruptly from the plains are generally aligned in a north-south direction. The Caballo and Fra Cristobal Ranges occupy relatively large areas immediately east of the Rio Grande River.

The plains area, which is associated with the mountainous upland areas in the eastern part of the survey area, consists of two broad general topographic areas—the piedmont slopes and the basin floors. The piedmont slopes typically grade from the mountainous



areas of the eastern side toward the level to gently sloping basin floors of the Jornada del Muerto. Elevations of the plains range from 4,100 feet in the southeast to slightly more than 5,500 feet at the base of the San Andres Mountains, along the eastern side.

## Land Use

About 10,000 acres of the Rio Grande and Palomas Valleys are irrigated, and small, isolated tracts of the Alamosa, Cuchillo, Las Animas, and Percha Valleys are irrigated. Only about 0.5 percent of the survey area is irrigated. The remaining 99.5 percent is used for urban development, livestock grazing, wildlife habitat, watershed, recreation, and copper mining.

Much of the land is used for livestock grazing, and ranching is still a major agricultural enterprise. Approximately 29,000 head of cattle are in the survey area.

## History and Development

The Rio Grande River served as a route for Spanish travelers. The earliest recorded passage through the area was that of Fray Agustin Rodriguez, a Franciscan missionary, in 1581. He was followed 2 years later by Antonio de Espejo. Juan de Ornate also passed through the area. He founded El Paso del Norte (now Ciudad Juarez) before moving northward across the Jornada del Muerto. Some of the early Franciscans brought with them many thousands of sheep for food and clothing and for trading with the Indians.

A number of colonies were established along the river by immigrants from Mexico after the overthrow of Spanish power in 1812. Many land grants were established, including the Pedro Armendaris.

In 1848, General Kearney took possession of New Mexico for the United States. In 1849, Captain R. B. March led an expedition from San Antonio to Santa Fe (7). On the return trip, he crossed the Jornada del Muerto. He reported small settlements of inhabitants whose subsistence depended almost entirely on irrigating and cultivating the soil.

The Santa Fe Railroad, completed in 1881, brought large numbers of settlers to the area. Considerable mining activity was in the area by 1900, especially in the Hillsboro and Lake Valley areas.

In 1916, construction of the Elephant Butte Dam was completed. This dam and a later built dam, Cabillo Dam, serve the valley area below. The irrigation downstream from the Elephant Butte and Caballo Reservoirs represents the highest development of irrigation in the area. Levees were completed in 1940 to control flooding along the river.

The population of Sierra County was about 8,457 in 1980.

## Water for Irrigation

Water for irrigation is first stored in the Elephant Butte Reservoir. It is released while generating electric power and then stored in the Caballo Reservoir. From there, it is diverted into irrigation channels during the irrigation season for use on cropland. Additional water is pumped from wells for use in areas above the irrigation channels. Well water is also used to supplement the channel water. Small areas are irrigated by diversions from the Alamosa, Cuchillo Negro, and Palomas Rivers and Las Animas and Percha Creeks. These water sources are not always reliable and, here again, some supplemental wells are used.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.



Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates; kind and amount of rock fragments; distribution of plant roots; reaction; and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of

the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# General Soil Map Units

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The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

## Map Unit Descriptions

### 1. Akela-Elbutte-Courthouse

*Shallow, well drained, nearly level to moderately rolling soils; on hills and basalt flows*

This map unit is in the eastern part of the survey area. Slope is mainly 1 to 15 percent. Elevation is 4,100 to 6,000 feet. The average annual precipitation is about 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 220 days.

This unit makes up about 4 percent of the survey area. It is about 33 percent Akela and similar soils, about 25 percent Elbutte soils, and about 20 percent Courthouse soils. The remaining 22 percent is components of minor extent.

Akela soils are on basalt flows. These soils are shallow and well drained. They formed in material derived dominantly from basalt. The surface layer is brown very gravelly loam about 3 inches thick. The upper 6 inches of the underlying material is light brown gravelly loam. The lower part to a depth of 14 inches is pink very gravelly loam. Caliche-coated basalt is at a depth of 14 inches.

Elbutte soils are on low side slopes east of the Caballo Mountains. These soils are shallow and well

drained. They formed in material derived dominantly from shale. The surface layer is light yellowish brown gravelly clay loam about 3 inches thick. The subsoil is light olive brown clay loam about 7 inches thick. The substratum to a depth of 14 inches is light olive brown extremely shaly silty clay loam. Light olive brown shale is at a depth of 14 inches.

Courthouse soils are on low hills. These soils are shallow and well drained. They formed in material weathered from sandstone and shale. The surface layer is yellowish red very cobbly very fine sandy loam about 2 inches thick. The underlying material to a depth of 10 inches is yellowish red and red gravelly loam. Sandstone is at a depth of 10 inches.

Of minor extent in this unit are Dona Ana, Minlith, and Stellar soils and Rock outcrop.

This unit is used for livestock grazing, watershed, and wildlife habitat.

This unit provides habitat for a characteristic wildlife community that includes coyote, desert cottontail, Texas antelope squirrel, rock squirrel, Merriam's kangaroo rat, white-throated woodrat, cactus mouse, rock pocketmouse, Swainson's hawk, cactus wren, curve-billed thrasher, black-throated sparrow, white-necked raven, scaled quail, western diamondback rattlesnake, collared lizard, and red-spotted toad. Woody vegetation serves as breeding habitat for mourning dove, Swainson's hawk, and roadrunner.

### 2. Dona Ana-Stellar-Wink

*Deep, well drained, nearly level to gently sloping soils; on piedmonts*

This map unit is throughout the survey area. Slope is mainly 0 to 9 percent. Elevation is mainly 4,050 to 5,500 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit makes up about 16 percent of the survey area. It is about 41 percent Dona Ana and similar soils, about 17 percent Stellar and similar soils, and about 15 percent Wink and similar soils. The remaining 27 percent is components of minor extent.

Dona Ana soils are on piedmonts. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is light brown very fine sandy loam



about 3 inches thick. The subsoil is light brown sandy clay loam about 15 inches thick. The upper 11 inches of the substratum is pink sandy clay loam. The lower part to a depth of 60 inches or more is light brown loam.

Stellar soils are in nearly level areas and in slightly depressional areas on piedmonts. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is brown loam about 2 inches thick. The subsoil is reddish brown. The upper 18 inches is clay loam, and the lower 18 inches is clay. The substratum to a depth of 60 inches or more is light reddish brown and pink clay loam.

Wink soils are in nearly level to gently sloping areas on ridges and side slopes of piedmonts. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is brown loamy fine sand about 2 inches thick. The upper 12 inches of the subsoil is light brown fine sandy loam. The lower 6 inches is light brown fine sandy loam. The substratum to a depth of 60 inches or more is pink gravelly sandy loam.

Of minor extent in this unit are Armijo, Cacique, Cruces, Largo, Mimbres, and Reakor soils and areas of sand dunes.

This unit is used for livestock grazing, watershed, and wildlife habitat.

This shrub-grassland unit provides habitat for a characteristic wildlife community that includes pronghorn antelope, badger, kit fox, desert cottontail, spotted ground squirrel, desert pocket gopher, desert pocket mouse, Ord's kangaroo rat, southern plains woodrat, western meadowlark, scaled quail, roadrunner, burrowing owl, New Mexico whip-tailed lizard, round-tailed horned lizard, and Couch's spadefoot toad.

Where large woody shrubs are present, this unit is a breeding area for Swainson's hawk, mockingbird, mourning dove, and white-necked raven. Where the unit has deteriorated to coppice dunes and interdune areas, the animal population is mainly burrowing mammals, their predators, and shrub-dependent birds.

Areas of the unit associated with playas are used by cranes for resting, and killdeer and Woodhouse's toad are resident. In the playas, desert shrimp and annual freshwater clams hatch and spawn.

### 3. Glendale-Gila-Brazito

*Deep, well drained to excessively drained, nearly level to gently sloping soils; on flood plains*

This map unit is in the central part of the survey area, along the Rio Grande River. Slope is mainly 0 to 5 percent. Elevation is 4,050 to 5,200 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit makes up about 3 percent of the survey area and includes 26,600 acres of lakes. The land area is about 34 percent Glendale and similar soils, about 18 percent Gila and similar soils, and about 17 percent

Brazito and similar soils. The remaining 31 percent is components of minor extent.

Glendale soils are in slightly depressional areas and in the less sloping areas on flood plains. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is very pale brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is stratified silty clay loam, clay loam, and fine sandy loam.

Gila soils are on nearly level flood plains of tributaries leading into the Rio Grande River. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is pale brown very fine sandy loam about 8 inches thick. The underlying material to a depth of 60 inches or more is pale brown, stratified silt loam, loam, very fine sandy loam, and fine sandy loam.

Brazito soils are on nearly level flood plains. These soils are deep and excessively drained. They formed in mixed alluvium. The surface layer is pale brown loamy fine sand about 6 inches thick. The underlying material to a depth of 60 inches or more is pale brown, stratified loamy fine sand and loamy very fine sand.

Of minor extent in this unit are Belen, Bluepoint, Caliza, and Yturbide soils, Riverwash, and Urban land.

Most areas of this unit are used as irrigated cropland. A few areas are used for livestock grazing, urban development, and wildlife habitat.

The main limitations of this unit for urban development are the possibility of a high water table and flooding in some areas.

This unit supports a characteristic wildlife community that includes desert mule deer, kit fox, desert cottontail, southern plains woodrat, spotted ground squirrel, Botta's pocket gopher, Swainson's hawk, vermilion flycatcher, western kingbird, mockingbird, plains spadefoot toad, tiger salamander, Rio Grande whip-tailed and round-tailed horned lizards, and western diamondback rattlesnake.

Riparian vegetation of the Rio Grande Valley and its associated irrigated croplands attract a diverse wildlife community including both nesting and migrating birds. The river provides habitat for waterfowl, shore and marsh birds, and other wetland species.

### 4. Ildefonso-Scholle-Goldust

*Deep, well drained, nearly level to extremely steep soils; on piedmonts*

This map unit is dominantly in the western part of the survey area. Slope is dominantly 1 to 75 percent. Elevation is 5,100 to 7,000 feet. The average annual precipitation is about 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit makes up about 10 percent of the survey area. It is about 29 percent Ildefonso and similar soils, about 25 percent Scholle and similar soils, and about 22



percent Goldust and similar soils. The remaining 24 percent is components of minor extent.

Ildefonso soils are on ridges and side slopes of piedmonts. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is brown gravelly loam about 4 inches thick. The subsoil is brown gravelly loam about 10 inches thick. The substratum to a depth of 60 inches or more is light brown and pink very gravelly loam.

Scholle soils are on alluvial fans on piedmonts. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is brown very gravelly loam about 5 inches thick. The subsoil is reddish brown and light reddish brown gravelly clay loam about 28 inches thick. The substratum to a depth of 60 inches or more is light reddish brown gravelly clay loam.

Goldust soils are on alluvial fans on piedmonts. These soils are deep and well drained. They formed in alluvium derived dominantly from acid igneous rock. The surface layer is dark gray very gravelly clay loam about 8 inches thick. The upper 11 inches of the subsoil is brown gravelly clay. The lower 13 inches is brown very gravelly clay. The substratum to a depth of 60 inches or more is pink and pinkish gray very gravelly sandy clay loam.

Of minor extent in this unit are Manzano, Muzzler, and Redbank soils, Ustorthents, and Rock outcrop.

This unit is used for livestock grazing, watershed, and wildlife habitat.

This open grassland unit provides habitat that supports a characteristic wildlife community that includes black-tailed jackrabbit, Merriam's kangaroo rat, white-throated woodrat, white-footed mouse, coyote, red-tailed hawk, common raven, meadowlark, loggerhead shrike, Chihuahua whiptailed lizard, prairie spadefoot toad, prairie rattlesnake, and striped whipsnake.

## 5. Largo-Mimbres-Armijo

*Deep, well drained, nearly level to gently sloping soils; on flood plains, basin floors, alluvial fans, and terraces*

This map unit is mainly in the eastern part of the survey area. Slope is mainly 0 to 5 percent. Elevation is 4,050 to 5,800 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit makes up about 2 percent of the survey area. It is about 34 percent Largo and similar soils, about 27 percent Mimbres and similar soils, and about 20 percent Armijo and similar soils. The remaining 19 percent is components of minor extent.

Largo soils are in swales on flood plains. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is light reddish brown silt loam about 4 inches thick. The underlying material to a depth of 60 inches or more is reddish brown silty clay loam.

Mimbres soils are on flood plains, alluvial fans, and terraces. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is light brown silt loam about 7 inches thick. The subsoil is pinkish gray silty clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is brown and pink silt loam that commonly has thin strata of gravelly loam throughout.

Armijo soils are on flood plains and basin floors. These soils are deep and well drained. They formed in mixed alluvium. The surface layer is brown clay about 5 inches thick. The underlying material to a depth of 60 inches or more is brown clay.

This unit is used for livestock grazing and wildlife habitat.

Of minor extent in this unit are Armijo soils that are sodium-affected and Agustin and Bluepoint soils.

If this unit is used for homesite development, the main limitations are flooding and high shrink-swell potential.

This unit provides habitat for a characteristic wildlife community that includes pronghorn antelope, black-tailed jackrabbit, coyote, sparrow hawk, quail, meadowlark, coachwhip, western diamondback rattlesnake, and western spadefoot toad. Where present, large woody shrubs provide nesting habitat for black-throated sparrow, mockingbird, and mourning dove.

Areas of this unit associated with intermittent pools or playas are used by cranes for resting; killdeer and Woodhouse's toad are resident in these areas. In the pools and playas, desert shrimp and annual freshwater clams hatch and spawn.

## 6. Luzena-Rock outcrop

*Shallow, well drained, moderately undulating to extremely steep soils, and Rock outcrop; on hills, low mountains, ledges, escarpments, peaks, and ridges*

This map unit is in the western part of the survey area. Slope is 5 to 95 percent. Elevation is 4,200 to 8,356 feet. The average annual precipitation is about 8 to 16 inches, the average annual air temperature is 47 to 62 degrees F, and the average frost-free period is 140 to 190 days.

This unit makes up about 17 percent of the survey area. It is about 42 percent Luzena and similar soils and about 30 percent Rock outcrop. The remaining 28 percent is components of minor extent.

Luzena soils are on hills and low mountains. These soils are shallow and well drained. They formed in material derived dominantly from acid igneous rock. The surface layer is brown gravelly loam about 2 inches thick. The subsoil to a depth of 14 inches is brown and reddish brown gravelly clay loam that has some cobbles and stones throughout. Rhyolite is at a depth of 14 inches.

Rock outcrop consists of areas of exposed acid igneous rock and smaller areas of exposed limestone,



sandstone, and basalt. It occurs as ledges, escarpments, peaks, and ridges.

Of minor extent in this unit are Aridic Haplustalfs and Ildefonso, Muzzler, Rizozo, Scholle, and Thunderbird soils.

This unit is used for livestock grazing, watershed, wildlife habitat, and esthetic value.

Areas that support pinyon and juniper provide habitat for a characteristic wildlife community that includes mule deer, mountain lion, bobcat, gray fox, ringtail, porcupine, desert cottontail, rock squirrel, chipmunk, white-throated woodrat, pinyon mouse, golden eagle, Swainson's hawk, common raven, pinyon jay, Cassin's kingbird, chipping sparrow, red-spotted toad, short-horned lizard, collared lizard, tree lizard, mountain patchnose snake, and black-tailed rattlesnake.

In the open hills, coyote, black-tailed jackrabbit, spotted ground squirrel, Merriam's kangaroo rat, mourning dove, meadowlark, horned lark, Couch's spadefoot toad, and rock rattlesnake are characteristic.

Areas of this unit that support deciduous riparian trees provide a unique habitat for a large and diverse wildlife population. Small areas of irrigated cropland provide seasonal food concentrations that attract birds and other wildlife. These areas also provide habitat for tassel-eared squirrel and many species of nesting birds and serve as a migration route for other birds.

## 7. Nickel-Bluepoint

*Deep, well drained to somewhat excessively drained, nearly level to extremely steep soils; on alluvial fans, terraces, and piedmonts*

This map unit is in the central part of the survey area, along the Rio Grande River. Slope is mainly 1 to 75 percent. Elevation is 4,050 to 5,800 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is about 58 to 65 degrees F, and the average frost-free period is about 180 to 220 days.

This unit makes up about 14 percent of the survey area. It is about 65 percent Nickel and similar soils and about 15 percent Bluepoint and similar soils. The remaining 20 percent is components of minor extent.

Nickel soils are on piedmont slopes and truncated piedmont faces. These soils are deep and well drained. They formed in gravelly mixed alluvium. The surface layer is light brown very gravelly fine sandy loam about 4 inches thick. The upper 8 inches of the underlying material is light brown very gravelly fine sandy loam, the next 12 inches is pink very gravelly fine sandy loam, and the lower part to a depth of 60 inches or more is light brown extremely gravelly sandy loam.

Bluepoint soils are on the lower part of truncated piedmont faces, alluvial fans, and terraces. These soils are deep and somewhat excessively drained. They formed in sandy mixed alluvium that has been modified by wind. The surface layer is yellowish brown loamy fine sand about 10 inches thick. The underlying material to a

depth of 60 inches or more is light yellowish brown, stratified fine sand.

Of minor extent in this unit are areas of Badland and Rock outcrop, Yturbide soils, and Torriorthents.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The main limitations of this unit for homesite development are steepness of slope and the hazard of erosion.

This unit provides habitat which supports a characteristic wildlife community that includes coyote, desert cottontail, Merriam's kangaroo rat, white-throated woodrat, cactus mouse, golden eagle, Gambel's quail, crissal thrasher, black-throated sparrow, collared lizard, round-tailed horned lizard, striped whipsnake, and Couch's spadefoot toad.

Where large woody plants are present, white-necked raven and mourning dove nest. In areas of the unit that have deteriorated to dunes and interdune areas where mesquite has invaded, the animal population is mainly burrowing mammals and their predators and shrub-dependent birds.

The riparian vegetation of the adjoining Rio Grande Valley and its associated irrigated croplands provide habitat for a diverse wildlife community including both nesting and migrating birds. The river provides seasonal habitat for waterfowl, shore and marsh birds, and other wetland species.

## 8. Rock outcrop-Torriorthents-Courthouse

*Rock outcrop, and shallow to deep, well drained, moderately undulating to extremely steep soils; on piedmonts, hills, low mountains, ridges, ledges, and escarpments*

This map unit is throughout the survey area. Slope is 5 to 150 percent. Elevation is 4,000 to 6,800 feet. The average annual precipitation is about 8 to 13 inches, the average annual air temperature is about 56 to 65 degrees F, and the frost-free period is 170 to 220 days.

This unit makes up about 9 percent of the survey area. It is about 40 percent Rock outcrop, about 20 percent Torriorthents, and about 16 percent Courthouse and similar soils. The remaining 24 percent is components of minor extent.

Rock outcrop consists of areas of exposed acid igneous rock, basalt, limestone, shale, metamorphic rock, and sandstone. It occurs as ridges, ledges, and escarpments.

Torriorthents are on hills and piedmonts. These soils are shallow to deep and well drained. They formed in mixed colluvium and alluvium. A sample pedon has a surface layer of brown cobbly loam 3 inches thick. The upper 7 inches of the underlying material is light brown very cobbly loam, and the lower part to a depth of 60 inches or more is light brown, stratified gravelly loam, cobbly sandy loam, and very gravelly sandy loam.



Courthouse soils are on hills and low mountains. These soils are shallow and well drained. They formed in material derived from sandstone and shale. The surface layer is yellowish red very cobbly very fine sandy loam about 2 inches thick. The underlying material is yellowish red and red gravelly loam about 8 inches thick. Sandstone is at a depth of 10 inches.

Of minor extent in this unit are Deama and Lozier soils.

This unit is used for livestock grazing, watershed, wildlife habitat, and esthetic value.

This unit provides habitat which supports a characteristic wildlife community that includes desert mule deer, ringtail, desert cottontail, Texas antelope squirrel, rock pocket mouse, cactus mouse, white-throated woodrat, turkey vulture, cactus wren, curve-billed thrasher, blue gray gnatcatcher, brown towhee, rufous-crowned sparrow, rock rattlesnake, mountain patchnose snake, canyon treefrog, red-spotted toad, long-tailed brush lizard, and collared lizard.

Where high cliffs and ledges are present, golden eagle and prairie falcon perch over the surrounding terrain to hunt. This site is considered ancestral range of the desert bighorn sheep.

## 9. Simona-Delnorte-Nickel

*Shallow and deep, well drained, gently undulating to moderately undulating soils; on piedmonts*

This map unit is throughout the survey area. Slope is mainly 1 to 15 percent. Elevation is 4,050 to 5,800 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit makes up about 20 percent of the survey area. It is about 33 percent Simona and similar soils, about 26 percent Delnorte and similar soils, and about 20 percent Nickel and similar soils. The remaining 21 percent is components of minor extent.

Simona soils are in sandy areas of the piedmonts, mostly on the east side of the survey area. These soils are shallow and well drained. They formed in mixed alluvium. The surface layer is light brown loamy fine sand about 4 inches thick. The subsoil is light brown gravelly fine sandy loam about 11 inches thick. The upper part of the substratum is indurated caliche, and the lower part to a depth of 60 inches or more is hard caliche nodules and gravel cemented with caliche.

Delnorte soils are on piedmonts. These soils are shallow and well drained. They formed in gravelly mixed alluvium. The surface layer is light yellowish brown very gravelly fine sandy loam and very gravelly loam about 10 inches thick. The underlying material to a depth of 14 inches is very pale brown very gravelly loam. The next 12 inches is indurated caliche. The next layer to a depth of 60 inches or more is hard nodules of caliche weakly cemented together.

Nickel soils are on piedmonts. These soils are deep and well drained. They formed in gravelly mixed alluvium. The surface layer is light brown very gravelly fine sandy loam about 4 inches thick. The upper 20 inches of the underlying material is light brown and pink very gravelly fine sandy loam. The lower part to a depth of 60 inches or more is light brown extremely gravelly sandy loam.

Of minor extent in this unit are Armijo, Holloman, Largo, and Mimbres soils.

This unit is used for livestock grazing, watershed, and wildlife habitat.

This unit provides habitat which supports a characteristic wildlife community that includes pronghorn antelope, kit fox, desert cottontail, Merriam's kangaroo rat, white-throated woodrat, spotted ground squirrel, golden eagle, scaled quail, crissal thrasher, black-throated sparrow, collared lizard, round-tailed horned lizard, striped whipsnake, and Couch's spadefoot toad.

The woody vegetation of associated desert drainageways provides breeding areas for mourning dove, Swainson's hawk, and roadrunner.

## 10. Tres Hermanos-Hap-Eba

*Deep, well drained, nearly level to moderately sloping, gravelly soils; on piedmonts*

This map unit is in the western part of the survey area. Slope is mainly 1 to 10 percent. Elevation is 4,050 to 5,900 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is about 58 to 65 degrees F, and the average frost-free period is about 180 to 220 days.

This unit makes up about 5 percent of the survey area. It is about 39 percent Tres Hermanos soils, about 16 percent Hap soils, and about 16 percent Eba soils. The remaining 29 percent is components of minor extent.

Tres Hermanos soils are on piedmonts. These soils are deep and well drained. They formed in gravelly mixed alluvium. The surface layer is light brown gravelly loam about 3 inches thick. The subsoil is brown gravelly clay loam about 13 inches thick. The substratum to a depth of 60 inches or more is pink extremely gravelly loam and extremely gravelly sandy loam.

Hap soils are on piedmonts. These soils are deep and well drained. They formed in gravelly mixed alluvium. The surface layer is reddish brown very gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly sandy clay loam. The lower 13 inches is yellowish red gravelly clay loam. The substratum to a depth of 60 inches or more is pink and light pink very gravelly sandy clay loam and very cobbly sandy clay loam.

Eba soils are on piedmonts. These soils are deep and well drained. They formed in gravelly mixed alluvium. The surface layer is brown very gravelly loam about 3 inches thick. The subsoil is reddish brown very gravelly clay loam about 18 inches thick. The upper 8 inches of the



substratum is pink very gravelly clay loam that is weakly cemented with caliche and gravel. The lower part to a depth of 60 inches or more is light brown very gravelly clay loam.

Of minor extent in this unit are Cave, Delnorte, and Simona soils.

This unit is used for livestock grazing, watershed, and wildlife habitat.

This unit provides habitat which supports a characteristic wildlife community that includes pronghorn

antelope, badger, desert cottontail, spotted ground squirrel, desert pocket mouse, Merriam's kangaroo rat, southern plains woodrat, Swainson's hawk, roadrunner, crissal thrasher, black-throated sparrow, white-necked raven, scaled quail, greater earless lizard, leopard lizard, round-tail horned lizard, and striped whipsnake.

The woody shrubs of desert washes concentrate wildlife and provide breeding habitat for mockingbird, mourning dove, Swainson's hawk, and roadrunner.

## Detailed Soil Map Units

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The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under “Use and Management of the Soils.”

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils and miscellaneous areas have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Harkey loam is one of several phases in the Harkey series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Berino-Dona Ana complex, hummocky, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or



miscellaneous areas are somewhat similar. Nickel-Chamberina association, gently sloping, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Arizo and Canutio soils, gently sloping, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop, extremely steep, is an example.

This survey was mapped at two levels of detail. At the most detailed level, map units are narrowly defined. This means that map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. The narrowly defined units are indicated by an asterisk in the map legend. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

## Map Unit Descriptions

**1—Adelino loam.** This deep, well drained soil is on terraces, alluvial fans, and benches of old flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,150 to 4,350 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is pale brown loam about 12 inches thick. The subsoil is brown loam and clay loam about 18 inches thick. The substratum to a depth of 60 inches or more is grayish brown clay loam. In some small areas the surface layer is clay loam.

Included in this unit are small areas of Mimbres soils in swales and soils that are gravelly throughout and are on low ridges. Included areas make up about 15 percent of the total acreage.

Permeability of this Adelino soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**2—Agua loam.** This deep, well drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown loam about 12 inches thick. The upper 21 inches of the underlying material is brown loam and pale brown silt loam, and the lower part to a depth of 60 inches or more is pale brown loamy fine sand, fine sand, and sand. In some small areas the surface layer is clay loam or sandy clay loam.

Included in this unit are small areas of Anthony, Brazito, Harkey, and Vinton soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Agua soil is moderate to a depth of 33 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**3—Agustin gravelly sandy loam, 1 to 9 percent slopes.** This deep, well drained soil is on alluvial fans of ephemeral streams leading onto valley floors. It formed in mixed alluvium. Slope is 1 to 9 percent. Irrigated areas commonly are bench leveled. Areas are irregular in shape and are 3 to 40 acres in size. Elevation is 4,100 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65



degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown gravelly sandy loam about 6 inches thick. The subsoil is light brown gravelly sandy loam about 14 inches thick. The substratum to a depth of 60 inches or more is pink very gravelly sandy loam and light brown gravelly sandy loam.

Included in this unit are small areas of Canutio and Arizo soils in areas along the ephemeral stream channels. Included areas make up about 15 percent of the total acreage.

Permeability of this Agustin soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for irrigated crops, urban development, and wildlife habitat. It is best suited to crops such as alfalfa, pasture, and chili peppers.

This unit is suited to irrigated crops. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Diversions may be needed to prevent flooding. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is suited to urban development. The main limitations are slope and coarse fragments. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

#### **4—Akela very gravelly loam, moderately rolling.**

This shallow, well drained soil is on basalt lava flows. It formed in material derived dominantly from basalt. Slope is 1 to 15 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grass and scattered shrubs (fig. 1). Elevation is 4,100 to 6,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown very gravelly loam about 3 inches thick. The upper 6 inches of the underlying material is light brown gravelly loam, and the lower part to a depth of 14 inches is pink very gravelly loam. Caliche-coated basalt is at a depth of 14 inches. In some areas the surface layer is stony loam and the soil is moderately deep to basalt.

Included in this unit are small areas of Tres Hermanos soils in swales, soils that are deep and moderately deep and are in swales, shallow to deep clay loam or clay in drainageways, and Rock outcrop along the rim of lava flows. Included areas make up about 15 percent of the total acreage.

Permeability of this Akela soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, sideoats grama, bush muhly, blue grama, and shrubs such as Apacheplume and fourwing saltbush. Scattered winterfat, littleleaf sumac, and cactus are in some areas. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 300 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, bush muhly, blue grama, fourwing saltbush, and winterfat decrease, and there is an increase in tobosa, threeawn, broom snakeweed, Apacheplume, and annual forbs. Creosotebush and mesquite invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use and planned grazing systems. It is not suited to such rangeland management practices as mechanical seeding and brush control because of the shallow soil depth, stoniness of the soil, and low rainfall. Fences and pipelines for providing water for livestock may be difficult to install on the unit because of the shallow depth to bedrock.

#### **5—Akela-Rock outcrop association, very steep.**

This map unit is on basalt lava flows. Slope is 10 to 55 percent. Areas are irregular in shape and are 100 to 480 acres in size. The native vegetation is mainly grass and scattered shrubs. Elevation is 4,100 to 6,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 50 percent Akela cobbly loam, 10 to 30 percent slopes, and 35 percent Rock outcrop, 10 to 55 percent slopes. The Akela soil is on small ridges, on rolling side slopes, and in saddles and between rock ledges. Rock outcrop occurs as protruding ridges, breaks along terminal lava flows, steep side slopes, and cones.

Included in this unit are small areas of moderately deep and deep, very stony and extremely stony alluvial and colluvial soils below rock ledges, at the base of the steep slopes, and small areas of deep clay loam in drainageways and swales. Included areas make up about 15 percent of the total acreage.

The Akela soil is shallow and well drained. It formed in material derived dominantly from basalt. Typically, the surface layer is brown cobbly loam about 2 inches thick. The upper 3 inches of the underlying material is light yellowish brown very gravelly loam, and the lower part to a depth of 11 inches is pale brown very gravelly loam. Caliche-coated basalt is at a depth of 11 inches. In some areas the surface is bouldery.





Figure 1.—An area of Akela very gravelly loam, moderately rolling, with black grama, tobosa grass, and barren patches of desert pavement.

Permeability of the Akela soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is moderate, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed basalt lava flows and areas that have less than 4 inches of soil material over basalt.

This unit is used as watershed and for wildlife habitat. Areas of the Akela soil that are accessible are also used for livestock grazing.

The potential natural plant community on the Akela soil is characterized by black grama, sideoats grama, bush muhly, blue grama, and shrubs such as Apacheplume and fourwing saltbush. Scattered winterfat, littleleaf sumac, and cactus are in some areas. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 300

pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, bush muhly, blue grama, fourwing saltbush, and winterfat decrease, and there is an increase in tobosa, threeawn, broom snakeweed, Apacheplume, and annual forbs. Creosotebush and mesquite invade in some areas.

The Akela soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. The soil is not suited to such rangeland management practices as mechanical seeding and brush control because of the shallow soil depth, the stoniness of the soil, the low rainfall, and the hazard of water erosion. Fences and pipelines for providing water for livestock are difficult to install on the Akela soil because of the shallow depth to bedrock. Steepness of slope may limit good distribution of livestock grazing in some areas.



**6—Anapra clay loam.** This deep, well drained soil is on the flood plain of the Rio Grande. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brownish gray loam about 11 inches thick. The upper 18 inches of the underlying material is light brownish gray clay loam, and the lower part to a depth of 60 inches or more is pale brown, stratified loamy sand and sand. In some small areas the surface layer is loam or silt loam.

Included in this unit are small areas of Agua, Brazito, Glendale, Harkey, and Vinton soils that are in positions similar to those of the Anapra soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Anapra soil is moderately slow to a depth of 29 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops and urban development.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Because of the moderately slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage crops. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is suited to urban development. The main limitations are the clayey texture of the soil and shrink-swell potential. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the building help to prevent structural damage because of shrinking and swelling.

**7—Anthony-Vinton fine sandy loams.** This map unit is on flood plains. Slope is 0 to 1 percent. Areas are irregular in shape and are 20 to 100 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 50 percent Anthony fine sandy loam and 35 percent Vinton fine sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas within the Rio Grande levees that are flooded and have a seasonal high water table. Also included are small areas of Harkey fine sandy loam and soils that are moderately deep over clayey material and are in positions similar to those of the Anthony and Vinton soils. Included areas make up about 15 percent of the total acreage.

The Anthony soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is grayish brown fine sandy loam about 12 inches thick (fig. 2). The underlying material to a depth of 60 inches or more is light brownish gray, stratified fine sandy loam, loam, and loamy fine sand. In some areas the surface layer is loam.

Permeability of the Anthony soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Vinton soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown and pale brown fine sandy loam about 15 inches thick. The underlying material to a depth of 60 inches or more is pale brown, very pale brown, and light brownish gray, stratified fine sand and loamy fine sand. In some areas the surface layer is loam.

Permeability of the Vinton soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops and urban development.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Soil blowing can be controlled by keeping the soil rough and cloddy when it is not protected by vegetation. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate.

Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is suited to urban development. The main limitations are the sandy texture of the soils, the hazard





Figure 2.—Onions being harvested on Anthony fine sandy loam.

of soil blowing, and low soil strength. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

**8—Anthony-Vinton loams.** This map unit is on flood plains. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 10 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 50 percent Anthony loam and 30 percent Vinton loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Agua loam and Harkey loam in positions similar to those of the Anthony and Vinton soils. Included areas make up about 20 percent of the total acreage.

The Anthony soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is grayish brown loam about 17 inches thick. The upper part of the underlying material is light brownish gray and light gray fine sandy loam about 23 inches thick, and the lower part to a depth of 60 inches or more is pale brown and brown sand and loamy fine sand. In some areas the surface layer is fine sandy loam or clay loam.

Permeability of the Anthony soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Vinton soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is pale brown loam about 16 inches thick. The underlying material to a depth of 60 inches or more is light gray, stratified fine sand, loamy fine sand, and loamy sand. In some areas the surface layer is silt loam or clay loam.



Permeability of the Vinton soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate.

Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**9—Anthony-Vinton clay loams.** This map unit is on flood plains. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 100 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 55 percent Anthony clay loam and 30 percent Vinton clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Harkey clay loam and Anapra clay loam in positions similar to those of the Anthony and Vinton soils. Included areas make up about 15 percent of the total acreage.

The Anthony soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown clay loam about 13 inches thick. The underlying material to a depth of 60 inches or more is pale brown and brown, stratified material that averages fine sandy loam. In some areas the surface layer is loam.

Permeability of the Anthony soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Vinton soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is grayish brown clay loam about 13 inches thick. The underlying material to a depth of 60 inches or more is pale brown and light brown, stratified loamy fine sand and loamy sand. In some areas the surface layer is loam.

Permeability of the Vinton soil is moderately rapid. Available water capacity is moderate. Effective rooting

depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate.

Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**10—Aridic Argiustolls-Goldust association, extremely steep.** This map unit is on steep and extremely steep side slopes of hills and mesas and dissected piedmonts. Slope is 35 to 95 percent. Areas are irregular in shape and are 80 to 480 acres in size. The native vegetation is mainly grass and scattered juniper and oak brush. Elevation is 5,300 to 6,800 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 45 percent Aridic Argiustolls, 35 to 95 percent slopes, and 35 percent Goldust gravelly clay loam, 35 to 55 percent slopes. Aridic Argiustolls are on extremely steep side slopes, and the Goldust soil is on ridges and less sloping side slopes.

Included in this unit are small areas of Rock outcrop on ledges and hilltops, Badland on extremely steep side slopes, and arroyos. Included areas make up about 20 percent of the total acreage.

Aridic Argiustolls are generally shallow to deep and are well drained. They are derived from mixed alluvial and colluvial sediment over basalt or cemented conglomerate. A sample profile has a very gravelly clay loam surface layer overlying a very gravelly clay subsoil and an extremely gravelly sandy clay substratum. Bedrock is at a depth of 28 inches. Depth to bedrock ranges from 10 to 60 inches or more.

Permeability of the Aridic Argiustolls is slow to moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 10 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing is slight.

The Goldust soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is dark grayish brown gravelly clay loam about 8 inches thick. The upper 7 inches of the subsoil is dark brown very



gravelly clay loam, and the lower 6 inches is brown very gravelly clay. The substratum to a depth of 60 inches or more is very gravelly clay loam and very gravelly sandy clay loam containing about 10 percent cobbles. In some areas the substratum is violently effervescent.

Permeability of the Goldust soil is slow. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing, where accessible, and for watershed and wildlife habitat.

The potential natural plant community on the Aridic Argiustolls is characterized by sideoats grama, black grama, little bluestem, and New Mexico feathergrass. Juniper and oak may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 375 pounds in unfavorable years. As the plant community deteriorates, sideoats grama, black grama, little bluestem, and New Mexico feathergrass decrease, and there is an increase in threeawn, hairy grama, blue grama, and woody plants. Mesquite invades in some areas.

The potential natural plant community on the Goldust soil is characterized by black grama, blue grama, sideoats grama, and New Mexico feathergrass. Scattered shrubs and halfshrubs are in some areas, but the overall appearance of the plant community is one of open grassland. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 550 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, and New Mexico feathergrass decrease, and there is an increase in threeawn, ring muhly, tobosa, blue grama, and annual forbs.

This unit is suited to such rangeland management practices as proper grazing use, fencing, and planned grazing systems. It is not suited to such rangeland management practices as rangeland seeding and mechanical brush control because of the steepness of slope and the hazard of water erosion. Pipelines for providing water for livestock are difficult to install because of the steepness of slope.

**11—Aridic Haplustalfs-Rock outcrop complex, extremely steep.** This map unit is on hills and mountains. Slope is 15 to 95 percent. Areas are irregular in shape and are 150 to 750 acres in size. The native vegetation is mainly juniper, pinyon, shrubs, and grasses. Elevation is 6,500 to 8,326 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 47 to 55 degrees F, and the average frost-free period is 140 to 170 days.

This unit is 60 percent Aridic Haplustalfs and 20 percent Rock outcrop. Aridic Haplustalfs are on hillsides

and ridges, and Rock outcrop is on ledges, escarpments, and peaks.

Included in this unit are small areas of Rubble land on extremely steep side slopes, deep loamy soils in swales and on narrow valley floors, and moderately deep to deep soils on alluvial fans. Included areas make up 20 percent of the total acreage.

The Aridic Haplustalfs are shallow to moderately deep and are well drained. They formed in colluvium derived from mixed igneous rock. Aridic Haplustalfs are variable in their characteristics. A sample profile has a cobbly clay loam surface layer about 3 inches thick. The subsoil is very gravelly and very cobbly clay loam 12 inches deep over igneous bedrock. Igneous bedrock generally is at a depth of 4 to 40 inches.

Permeability of the Aridic Haplustalfs is slow to moderate. Available water capacity is moderate to very low. Effective rooting depth generally is 4 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of ledges, escarpments, and peaks of barren or nearly barren exposed bedrock.

This unit is used for livestock grazing, wildlife habitat, and wood products such as fenceposts and firewood.

The potential natural plant community on this unit is mainly an overstory of juniper and pinyon and an understory of blue grama, sideoats grama, bottlebrush squirreltail, western wheatgrass, mountain muhly, mountainmahogany, and forbs. The crown canopy generally exceeds 25 percent. The average annual production of air-dry vegetation of understory species (those less than 4.5 feet high) ranges from 750 pounds per acre in favorable years to 300 pounds per acre in unfavorable years.

This unit has limited suitability for juniper and pinyon production. It supports a stand of trees with a basal area of about 55 square feet per acre. The potential is moderate for the production of firewood and is moderately low to moderate for the production of Christmas trees, pinyon nuts, posts, and stays. For optimum production of all resources, management should be for a combination of uses, including livestock grazing and wildlife habitat.

This unit is suited to such rangeland management practices as woodland pruning and thinning, proper grazing use, planned grazing systems, livestock water developments, and fencing. Fences and pipelines may be difficult to install in areas where the soils are shallow over bedrock or are stony and where side slopes are steep.

**12—Arizo-Riverwash complex, 1 to 3 percent slopes.** This map unit is on recent alluvial fans and flood plains of small valley floors associated with arroyos. Flooding is common. Slope is 1 to 3 percent. Areas are elongated and are 5 to 40 acres. The native vegetation is mainly shrubs. Elevation is 4,120 to 4,300 feet. The



average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Arizo very gravelly loamy sand, 1 to 3 percent slopes, and 35 percent Riverwash, 1 to 3 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bluepoint, Canutio, and Yturbide soils. Bluepoint soils are on low ridges and side slopes along valley walls, Canutio soils are on ridges within areas of Arizo soils, and Yturbide soils are along foot slopes of valley walls. Included areas make up about 20 percent of the total acreage.

The Arizo soil is deep and excessively drained. It formed in mixed alluvium. Typically, the surface layer is light grayish brown very gravelly loamy sand about 16 inches thick. The underlying material to a depth of 60 inches or more is pale brown and light grayish brown very gravelly sand.

Permeability of the Arizo soil is very rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow. The hazard of water erosion generally is slight; however, the hazard of streambank erosion is very high. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 2 years out of 5.

Riverwash is cobbles, gravel, and sand that is on arroyo bottoms. It is reworked frequently by water and supports little or no vegetation.

Riverwash is subject to frequent, very brief periods of flooding during June through September in 3 years out of 5.

This unit is used for limited livestock grazing, for wildlife habitat, and as a watercourse during runoff.

**13—Arizo and Canutio soils, gently sloping.** This map unit is on recent alluvial fans and flood plains of valley floors associated with arroyos. Slope is 1 to 9 percent. Areas are elongated and are 40 to 240 acres. The native vegetation is mainly shrubs. Elevation is 4,100 to 5,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

The pattern and proportion of the Arizo very gravelly sandy loam, 1 to 9 percent slopes, and Canutio very gravelly sandy loam, 1 to 9 percent slopes, are not uniform from one mapped area to another. A given area, however, commonly consists mainly of one soil or the other.

Included in this unit are small areas of Bluepoint and Yturbide soils and arroyo beds. Bluepoint and Yturbide soils are in the slightly higher lying areas. Bluepoint soils commonly are hummocky. Included areas make up about 20 percent of the total acreage.

The Arizo soil is deep and excessively drained. It formed in mixed alluvium. Typically, the surface layer is light brown very gravelly sandy loam about 4 inches thick. The underlying material to a depth of 60 inches or more is light brown very gravelly loamy sand.

Permeability of the Arizo soil is very rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow. The hazard of water erosion generally is slight; however, the hazard of streambank erosion is very high. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 2 years out of 5.

The Canutio soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is pale brown very gravelly sandy loam about 4 inches thick. The underlying material to a depth of 60 inches or more is light brown, stratified very gravelly sandy loam and very gravelly loam.

Permeability of the Canutio soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 1 year out of 5.

This unit is used for livestock grazing, wildlife habitat, and urban development.

The Arizo soil supports a plant community that includes fourwing saltbush, Apacheplume, Mormon-tea, and dropseed. As the plant community deteriorates, fourwing saltbush, dropseed, and Apacheplume decrease, and there is an increase in such plants as creosotebush, fluffgrass, broom snakeweed, mesquite, and arrowweed pluchea.

The potential natural plant community on the Canutio soil is characterized by dropseed, scattered black grama, bush muhly, creosotebush, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 425 pounds per acre in favorable years to 125 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, and fourwing saltbush decrease, and there is an increase in creosotebush, annuals, and broom snakeweed. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water development, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the relative inability of the soils to produce significant vegetation under natural conditions.

This unit is poorly suited to urban development. The main limitations are slope, flooding, and coarse fragments. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If the density of housing is moderate to high,



community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

**14—Armijo clay, 0 to 3 percent slopes.** This deep, well drained soil is in swales, on flood plains, and on basin floors. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are elongated and are 320 to 840 acres. The native vegetation is mainly grass. Elevation is 4,100 to 4,700 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the soil is brown clay to a depth of 60 inches or more. In some small areas the surface layer is silty clay.

Included in this unit are Armijo clay, alkali, and soils that are moderately deep over loamy material and are in positions similar to those of the Armijo soil. Also included are small areas of arroyos and gravelly soils on ridges. Included areas make up about 15 percent of the total acreage.

Permeability of this Armijo soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to frequent, very brief periods of flooding during June through September in 3 years out of 5.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by tobosa, vine-mesquite, alkali sacaton, and scattered woody plants. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 600 pounds in unfavorable years.

Deterioration of the plant community on this unit is sometimes associated with gulying. It is characterized by a substantial decrease in plant production. Burrograss, threeawn, and annuals replace the dominant plants in the potential plant community under these conditions. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water development, fencing, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and hazard of soil blowing.

**15—Armijo clay, alkali, 0 to 2 percent slopes.** This deep, well drained soil is on basin floors. It formed in mixed alluvium. Slope is 0 to 2 percent. Areas are oval and are 160 to 480 acres. The native vegetation is mainly grass. Elevation is 4,100 to 4,500 feet. The average annual precipitation is 8 to 10 inches, the

average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the soil is brown clay that is moderately sodium-affected to a depth of 60 inches or more (fig. 3).

Included in this unit are small areas of Armijo clay, 0 to 3 percent slopes, Mimbres silty clay loam, and soils that are similar to this Armijo soil but are silt loam below a depth of 20 inches. These included soils are slightly higher on the landscape than the Armijo soil. Included areas make up about 20 percent of the total acreage.

Permeability of this Armijo soil is very slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to frequent, brief periods of flooding during June through September in 3 years out of 5.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by alkali sacaton, saltbush, and some tobosa. The average annual production of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 1,500 pounds in unfavorable years. As the plant community deteriorates, alkali sacaton decreases, and there is an increase in less desirable grasses, shrubs, and forbs. Severe deterioration of the plant community may result in large, nearly barren areas characterized by an invasion of undesirable plants such as cocklebur.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**16—Badland-Nickel complex, extremely steep.** This map unit is on truncated alluvial piedmonts (fig. 4). Slope is 15 to 150 percent. Areas are irregular in shape and are 160 to 1,000 acres in size. The native vegetation is mainly sparse grass, halfshrubs, and shrubs. Badland is mostly barren. Elevation is 4,050 to 5,700 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Badland, 35 to 150 percent side slopes, and 35 percent Nickel very gravelly fine sandy loam, 15 to 55 percent slopes. Badland generally is on truncated side slopes, and the Nickel soil is in saddles and on ridgetops. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are not strongly effervescent in the substratum and are in positions similar to those of the Nickel soil. In addition are small areas of deep, loamy or clayey soils in





Figure 3.—An area of Armijo clay, alkali, 0 to 2 percent slopes, showing the effects of high shrink-swell potential.

drainageways, Rock outcrop, and arroyos. Included areas make up about 20 percent of the total acreage.

Badland consists of steep to extremely steep, barren, generally nonstony land broken by numerous, small, intermittent drainageways where streams have entrenched in soft, stratified, mixed alluvial sediment. Exposures of highly stratified sediment commonly are on nearly vertical faces.

The Nickel soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is pale brown very gravelly fine sandy loam about 2 inches thick. The upper 10 inches of the underlying material is yellowish brown very gravelly sandy loam, the next 7 inches is white very gravelly fine sandy loam that is weakly cemented with caliche, and the lower part to a depth of 60 inches or more is very pale brown very gravelly fine sandy loam over stratified piedmont sediment ranging from very gravelly loamy sand to clay.

Permeability of the Nickel soil is moderately slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

Most areas of this unit are used as watershed, for wildlife habitat, and for esthetic value. A few of the less sloping areas are used for livestock grazing and urban development.

The potential natural plant community on the Nickel soil is characterized by sparse stands of bush muhly, black grama, and creosotebush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. If the potential plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, mariola, and annual forbs. Eventually, creosotebush dominates the plant community.





Figure 4.—An area of Badland-Nickel complex, extremely steep.

Badland supports very sparse or no vegetation. Because of this and the steepness of slope, Badland is considered a grazing resource only in the most limited sense of the term.

The Nickel soil is suited to such rangeland management practices as proper grazing use, pipelines for providing water for livestock, fencing, and planned grazing systems. The Nickel soil in this unit is not suited to such rangeland management practices as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of water erosion. The steep slopes of the areas of Badland are also not suited.

This unit is poorly suited to urban development. In the small areas that are used for urban development, the main limitations are slope and coarse fragments. Most areas must be leveled if they are to be used for urban development.

**17—Belen clay loam.** This deep, well drained soil is on the flood plain of the Rio Grande. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brownish gray clay loam about 13 inches thick. The upper 15 inches of the underlying material is light brownish gray clay, and the lower part to a depth of 60 inches or more is light brownish gray, stratified silt loam and fine sandy loam. In some small areas the surface layer is clay or loam.

Included in this unit are small areas of Armijo, Anapra, and Glendale soils that are in positions similar to those of the Belen soil. Included areas make up about 15 percent of the total acreage.



Permeability of this Belen soil is slow to a depth of 28 inches and moderate below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated pasture and cultivated crops.

This unit is suited to crops such as cotton, small grain, grasses, and legumes. It is limited mainly by very slow permeability, poor tilth, and surface crusting.

Crusting of the surface and compaction can be reduced by returning crop residue to the soil. Also, returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface irrigation is suited to the soil in this unit. Water needs to be applied at a slow rate over a long period to insure that the root zone is properly wetted. Because of the very slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage crops. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**18—Berino-Dona Ana complex, hummocky.** This map unit is on piedmonts. Slope is 1 to 5 percent. Areas are irregular in shape and are 200 to 800 acres in size. The native vegetation is mainly grass and scattered shrubs and forbs. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 50 percent Berino loamy fine sand, 1 to 5 percent slopes, and 30 percent Dona Ana loamy fine sand, 1 to 5 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of sand dunes 18 to 48 inches high around woody shrubs. Also included are small areas of Reakor soils in slight swales and Cacique, Tres Hermanos, and Wink soils that are in positions similar to those of the Berino and Dona Ana soils. Included areas make up about 20 percent of the total acreage.

The Berino soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is yellowish red loamy fine sand about 5 inches thick. The subsoil is reddish brown sandy clay loam about 36 inches thick. The substratum to a depth of 60 inches or more is reddish yellow sandy loam.

Permeability of the Berino soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of

water erosion is slight. The hazard of soil blowing is very high.

The Dona Ana soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light reddish brown loamy fine sand about 6 inches thick. The subsoil is reddish brown sandy clay loam about 10 inches thick. The upper 14 inches of the substratum is pink sandy loam that commonly is weakly cemented, and the lower part to a depth of 60 inches or more is light reddish brown fine sandy loam.

Permeability of the Dona Ana soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, mesa dropseed, sand dropseed, bush muhly, and soap tree yucca. Forbs, low-growing shrubs, and halfshrubs such as broom snakeweed may be distributed evenly throughout but are in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 650 pounds per acre in favorable years to 225 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in dropseed, threeawn, broom snakeweed, and annual forbs. Severe deterioration is characterized by an intense infestation of mesquite or creosotebush and formation of dunes and barren or nearly barren interdunal areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**19—Berino-Dona Ana association, gently sloping.**

This map unit is on piedmonts. Slope is 1 to 7 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grass and scattered shrubs and forbs. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 40 percent Berino loamy fine sand, 1 to 7 percent slopes, and 35 percent Dona Ana sandy loam, 1 to 7 percent slopes. The Berino and Dona Ana soils are on similar landscapes. The Dona Ana soil commonly is on that part of the landscape where the source of alluvium is higher in content of lime.

Included in this unit are small areas of Stellar soils in slight swales and in the less sloping areas, Simona soils on ridges and in the higher lying areas on the landscape,



Reakor soils in the lower lying areas on the landscape, and Mimbres soils in drainageways. Included areas make up about 25 percent of the total acreage.

The Berino soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown loamy fine sand about 3 inches thick. The subsoil is yellowish red sandy clay loam about 29 inches thick. The substratum to a depth of 60 inches or more is pink loam.

Permeability of the Berino soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

The Dona Ana soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is reddish yellow sandy loam about 3 inches thick. The subsoil is reddish brown sandy clay loam about 14 inches thick. The substratum to a depth of 60 inches or more is light reddish brown sandy clay loam.

Permeability of the Dona Ana soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, mesa dropseed, sand dropseed, bush muhly, and soap tree yucca. Forbs and low-growing shrubs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 650 pounds per acre in favorable years to 225 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in dropseed, threeawn, broom snakeweed, and annual forbs. Severe deterioration is characterized by an intense infestation of mesquite and creosotebush and formation of dunes and barren or nearly barren interdunal areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of soil blowing and water erosion.

#### **20—Bluepoint loamy sand, 1 to 5 percent slopes.**

This deep, somewhat excessively drained soil is on alluvial fans, terraces, and ridges along both sides of the Rio Grande Valley. It formed in sandy mixed alluvium that has been modified by wind. Slope is 1 to 5 percent. Where areas are irrigated, they are generally bench leveled. Areas are irregular in shape and are 10 to 100 acres in size. Elevation is 4,120 to 4,300 feet. The

average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brownish gray loamy sand about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray, stratified loamy sand and loamy fine sand.

Included in this unit are small areas of Arizo, Caliza, Canutio, and Yturbide soils, Riverwash, and arroyos. Included areas make up about 25 percent of the total acreage.

Permeability of this Bluepoint soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is none to slight. The hazard of soil blowing is very high.

This unit is used for irrigated crops and wildlife habitat.

This unit is suited to crops such as alfalfa, pasture, and small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Soil blowing is reduced by planting a close growing cover crop. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Because the water intake rate is rapid, sprinkler or drip irrigation is best suited to the soil in this unit. Because the soil is droughty, applications of irrigation water should be light and frequent. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

#### **21—Bluepoint loamy fine sand, moderately rolling.**

This deep, somewhat excessively drained soil is on truncated piedmonts and alluvial fans. It formed in sandy, mixed alluvium that is reworked by wind and is often blown into dunes. Slope is 1 to 15 percent. Areas are irregular in shape and are 100 to 600 acres in size. The native vegetation is mainly grass and shrubs. Elevation is 4,050 to 5,200 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is yellowish brown loamy fine sand about 10 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown fine sand. In some small areas the surface layer is fine sand. In some of the more steeply sloping areas, the underlying material is more than 15 percent gravel.

Included in this unit are small areas of Arizo and Caliza soils adjacent to arroyos and Pajarito soils in the less sloping areas and on arroyo bottoms. Included areas make up about 15 percent of the total acreage.

Permeability of this Bluepoint soil is rapid. Available water capacity is low. Effective rooting depth is 60



inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing, wildlife habitat, and urban development.

The potential natural plant community on this unit is characterized by giant dropseed, mesa dropseed, spike dropseed, broom dalea, and sand sagebrush. Scattered yucca is in some areas. Forbs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 600 pounds per acre in favorable years to 175 pounds in unfavorable years. As the plant community deteriorates, giant dropseed and spike dropseed decrease, and there is an increase in broom dalea, sand sagebrush, broom snakeweed, and annual forbs. Mesquite and juniper invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

This unit is poorly suited to urban development. The main limitations are the sandy texture, the hazard of soil blowing, and steepness of slope. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If the density of housing is moderate to high, community sewage systems are needed.

**22—Brazito loamy fine sand.** This deep, excessively drained soil is on the flood plain of the Rio Grande Valley. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 160 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brownish gray loamy fine sand about 4 inches thick. Below this is a buried surface layer of light brownish gray sandy loam about 12 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sand. Where this unit is within the levees of the Rio Grande, a seasonal high water table is within 2 to 5 feet of the surface. In some small areas the surface layer is very fine sandy loam.

Included in this unit are small areas of Agua, Anthony, and Vinton soils that are in positions similar to those of the Brazito soil. Included areas make up about 20 percent of the total acreage.

Permeability of this Brazito soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for irrigated crops and wildlife habitat.

This unit is suited to crops such as alfalfa, pasture, and small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Soil blowing is reduced by planting a close growing cover crop. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Because the water intake rate is rapid, sprinkler or drip irrigation is best suited to the soil in this unit. Because the soil is droughty, applications of irrigation water should be light and frequent. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

**23—Brazito loamy fine sand, gently sloping.** This deep, excessively drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 5 percent. Areas are irregular in shape and are 150 to 640 acres in size. The native vegetation is mainly grass. Elevation is 4,050 to 5,200 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is pale brown loamy fine sand about 6 inches thick. The underlying material to a depth of 60 inches or more is pale brown, stratified sand and fine sand. In some small areas the surface layer is fine sand or fine sandy loam. In some areas the part of the substratum below a depth of 40 inches is finer textured.

Included in this unit are small areas of soils that are gravelly sand throughout and are in positions similar to those of the Brazito soil. Also included are small areas of Gila and Glendale soils and soils that have a high water table. These included areas are in the slightly lower positions on flood plains and are subject to occasional, brief periods of flooding. Included areas make up about 15 percent of the total acreage.

Permeability of this soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community of this unit is not readily predictable, although giant sacaton is believed to be the natural dominant species. If the range has deteriorated, mesquite, inland saltgrass, and scattered annuals dominate and production of vegetation is very low.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, planned grazing systems, and chemical brush control. It has limited suitability for



practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**24—Brazito very fine sandy loam.** This deep, excessively drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is pale brown very fine sandy loam about 14 inches thick. The underlying material to a depth of 60 inches or more is pale brown and light brownish gray sand. In some small areas the surface layer is loamy fine sand.

Included in this unit are small areas of Anthony, Agua, and Vinton soils that are in positions similar to those of the Brazito soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Brazito soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops, urban development, and wildlife habitat.

This unit is suited to crops such as alfalfa, pasture, and small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Soil blowing is reduced by planting a close growing cover crop. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Because the water intake rate is rapid, sprinkler or drip irrigation is best suited to the soil in this unit. Because the soil is droughty, applications of irrigation water should be light and frequent. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

**25—Caliza-Bluepoint-Yturbide association, very steep.** This map unit is on truncated piedmonts and alluvial fans. Slope is 3 to 35 percent. Areas are irregular in shape and are 60 to 480 acres in size. The native vegetation is mainly grass and shrubs. Elevation is 4,100 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 30 percent Caliza very gravelly sandy loam, 3 to 35 percent slopes, 30 percent Bluepoint fine sand, 3 to 15 percent slopes, and 25 percent Yturbide gravelly loamy fine sand, 3 to 35 percent slopes. The Caliza soil is on the highest positions on ridgetops, the Yturbide soil

is on intermediate positions along toe slopes, and the Bluepoint soil is on the lowest positions of the landscape.

Included in this unit are small areas of Chamberino and Nickel soils on the more stable ridgetops, Rock outcrop, and arroyos. Included areas make up about 15 percent of the total acreage.

The Caliza soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown very gravelly sandy loam about 4 inches thick. The upper 8 inches of the underlying material is light brown very gravelly sandy loam, and the lower part to a depth of 60 inches or more is pink and light brown very gravelly loamy sand.

Permeability of the Caliza soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff generally is slow, but it is rapid during prolonged and intense rainstorms. The hazard of water erosion varies with slope from slight to very high. The hazard of soil blowing is high.

The Bluepoint soil is deep and somewhat excessively drained. It formed in mixed alluvium that is reworked by wind and is often blown into dunes. Typically, the surface layer is yellowish brown fine sand about 10 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown loamy fine sand.

Permeability of the Bluepoint soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

The Yturbide soil is deep and excessively drained. It formed in mixed alluvium. Typically, the soil is yellowish brown and light yellowish brown gravelly loamy fine sand to a depth of 60 inches or more.

Permeability of the Yturbide soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing, wildlife habitat, and urban development.

The potential natural plant community on the Bluepoint and Yturbide soils is characterized by giant dropseed, mesa dropseed, spike dropseed, broom dalea, sand sagebrush, and yucca. Forbs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 600 pounds per acre in favorable years to 175 pounds in unfavorable years. As the plant community deteriorates, giant dropseed and spike dropseed decrease, and there is an increase in broom dalea, sand sagebrush, broom snakeweed, and annual forbs. Mesquite and juniper invade in some areas.

The potential natural plant community on the Caliza soil is characterized by mesa dropseed, sand dropseed, scattered black grama, bush muhly, and creosotebush. The average annual production of air-dry vegetation



ranges from 425 pounds per acre in favorable years to 125 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in creosotebush, threeawn, fluffgrass, mariola, and broom snakeweed. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of soil blowing and water erosion.

This unit is poorly suited to urban development. The main limitations are the sandy texture of the soils, the hazard to soil blowing, and steepness of slope. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If the density of housing is moderate to high, community sewage systems are needed.

**26—Canutio-Pajarito association, moderately rolling.** This map unit is on alluvial fans. Slope is 1 to 15 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grass and scattered shrubs and halfshrubs. Elevation is 4,100 to 5,100 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Canutio very gravelly sandy loam, 1 to 15 percent slopes, and 35 percent Pajarito gravelly sandy loam, 1 to 9 percent slopes. The Canutio soil is on ridges and side slopes and in the adjoining, more steeply sloping areas, and the Pajarito soil is in the nearly level to slightly concave areas.

Included in this unit are small areas of Glendale and Gila soils on flood plains and Bluepoint and Yturbide soils in the more steeply sloping areas and arroyos. Included areas make up about 20 percent of the total acreage.

The Canutio soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is pale brown very gravelly sandy loam about 4 inches thick. The underlying material to a depth of 60 inches or more is light brown, stratified very gravelly sandy loam, extremely gravelly sandy loam, and very gravelly loamy sand.

Permeability of the Canutio soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Pajarito soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown gravelly sandy loam about 4 inches thick. The subsoil is brown and light brown loam about 14 inches thick. The substratum to a depth of 60 inches or more is light brown and light yellowish brown loam.

Permeability of the Pajarito soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on the Pajarito soil is characterized by black grama, sand dropseed, bush muhly, threeawn, and cane bluestem. The average annual production of air-dry vegetation ranges from 650 pounds per acre in favorable years to 225 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in dropseed, threeawn, fluffgrass, and broom snakeweed. Mesquite and creosotebush readily invade.

The potential natural plant community on the Canutio soil is characterized by mesa dropseed, sand dropseed, scattered black grama, bush muhly, and creosotebush. The average annual production of air-dry vegetation ranges from 425 pounds per acre in favorable years to 125 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in creosotebush, threeawn, fluffgrass, mariola, and broom snakeweed. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. The unit has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of soil blowing and water erosion.

**27—Cave gravelly fine sandy loam, moderately undulating.** This shallow, well drained soil is on piedmonts. It formed in mixed alluvium derived dominantly from limestone. Slope is 1 to 5 percent. Areas are irregular in shape and are 640 to 1,800 acres in size. The native vegetation is mainly grass. Elevation is 4,700 to 5,500 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light yellowish brown gravelly fine sandy loam about 3 inches thick. The underlying material is brown, pale brown, and very pale brown gravelly loam and very gravelly loam about 10 inches thick. Very hard, cemented and laminated caliche is at a depth of 13 inches.

Included in this unit are small areas of Dona Ana and Wink soils in nearly level areas and in slightly depressional areas, and Tencee soils on low ridges and side slopes of drainageways. Also included are small areas of moderately deep soils that are gravelly loam over very hard, cemented caliche and are in slightly





Figure 5.—An area of Courthouse-Rock outcrop association, very steep.

depressional areas. Included areas make up about 20 percent of the total acreage.

Permeability of this Cave soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is dominated by black grama, but blue grama, bush muhly, cane bluestem, winterfat, and scattered forbs typically are present. Scattered yucca is in some areas, but the overall appearance of the plant community is largely that of open grassland. The estimated annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 325 pounds in unfavorable years. If the potential plant community deteriorates, black grama, blue grama, bush muhly, cane bluestem, and winterfat

decrease, and there is an increase in threeawn, fluffgrass, broom snakeweed, annual forbs, and annual grasses. Tarbush, creosotebush, and mesquite invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, planned grazing systems, and livestock water developments. It is not suited to such rangeland management practices as mechanical brush control and rangeland seeding because of the shallow depth to the hard caliche, the hazard of soil blowing, and the low rainfall. Fences and pipelines for providing water for livestock are difficult to install on the Cave soil because of the shallow depth to hard caliche.

**28—Courthouse-Rock outcrop association, very steep.** This map unit is on hills (fig. 5). Slope is 15 to 55 percent. Areas are irregular in shape and are 100 to 640 acres in size. The native vegetation is mainly grass and



scattered shrubs. Elevation is 4,400 to 6,000 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 210 days.

This unit is 45 percent Courthouse very cobbly very fine sandy loam, 15 to 55 percent slopes, and 35 percent Rock outcrop, 15 to 55 percent slopes. The Courthouse soil is on small ridges, on hilltops, between sandstone ledges, and in saddles. Rock outcrop consists of ridges, hill crests, ledges, and steep side slopes.

Included in this unit are small outcroppings of shale between ledges of sandstone and small outcroppings of limestone and igneous rock. Also included are small areas of Elbutte soils between ledges of sandstone outcroppings, shallow and moderately deep very stony loam on toe slopes, and shallow soils that have a clay loam or sandy clay loam subsoil and are in the less sloping areas. Included areas make up about 20 percent of the total acreage.

The Courthouse soil is shallow and well drained. It formed in material weathered from sandstone and shale. Typically, the surface layer is yellowish red very cobbly very fine sandy loam about 2 inches thick. The underlying material is yellowish red and red gravelly loam 8 inches thick. Sandstone is at a depth of 10 inches.

Permeability of the Courthouse soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed sandstone.

This unit is used for watershed and wildlife habitat. Areas of the Courthouse soil that are accessible are also used for livestock grazing.

The potential natural plant community on the Courthouse soil is characterized by black grama, bush muhly, cane bluestem, green sprangletop, littleleaf sumac, yucca, ocotillo, and various cacti. Scattered shrub, live oak, and juniper are in some areas. The estimated annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 325 pounds in unfavorable years. If the potential plant community deteriorates, black grama, bush muhly, cane bluestem, and green sprangletop decrease, and there is an increase in threeawn, slim tridens, broom snakeweed, annual forbs, and shrubs. Mesquite invades in some areas.

The Courthouse soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. The soil is not suited to such rangeland management practices as mechanical brush control because the soil is shallow and stony and because of the hazard of water erosion. Practices that facilitate rangeland management such as pipelines for providing water for livestock and fences are difficult to install on this soil because of the shallow depth to

sandstone and stoniness. Steepness of slope limits accessibility by livestock in some areas.

**29—Cruces-Cacique complex, hummocky.** This map unit is on piedmonts. Slope is 1 to 5 percent. Areas are irregular in shape and are 160 to 480 acres in size. The native vegetation is mainly grass and scattered shrubs and forbs. Elevation is 4,050 to 5,400 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Cruces sandy loam, 1 to 5 percent slopes, and 25 percent Cacique fine sandy loam, 1 to 5 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of sand dunes 15 to 60 inches high that make up about 15 percent of the area. Also included are small areas of Simona soils that are mainly on ridges and Wink soils that commonly are in saddles and swales. All included areas make up about 30 percent of the unit.

The Cruces soil is shallow and well drained. It formed in mixed alluvium. The surface has been mostly lost through erosion. Typically, the surface layer is yellowish red sandy loam about 1 inch thick. The subsoil is yellowish red sandy clay loam about 17 inches thick. The upper 20 inches of the substratum is indurated pinkish white, extremely hard and laminated caliche, and the lower part to a depth of 60 inches or more is pinkish white, hard caliche nodules that are weakly cemented together. The substratum is rippable with heavy equipment.

Permeability of the Cruces soil is moderate. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Cacique soil is moderately deep and well drained. It formed in mixed alluvium. Typically, the surface layer is reddish brown fine sandy loam 2 inches thick. The upper 4 inches of the subsoil is reddish brown fine sandy loam, the next 11 inches is reddish brown sandy clay loam, and the lower 12 inches is reddish yellow fine sandy loam. The upper 20 inches of the substratum is indurated pinkish white, extremely hard and laminated caliche, and the lower part to a depth of 60 inches or more is hard caliche nodules that are weakly cemented together. The substratum is rippable with heavy equipment.

Permeability of the Cacique soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, mesa dropseed, sand



dropseed, bush muhly, and soaptree yucca. Forbs and low-growing shrubs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 650 pounds per acre in favorable years to 225 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in plants such as dropseed, threeawn, broom snakeweed, and annual forbs. Severe deterioration is characterized by an intense infestation of mesquite and formation of dunes and barren or nearly barren interdunal areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of soil blowing and water erosion. Practices that facilitate rangeland management such as installing fences and pipelines for providing water for livestock are difficult to apply on the Cruces soil because of the shallow depth to hard caliche.

**30—Delnorte-Cave-Tencee complex, moderately rolling.** This map unit is on piedmonts. Slope is 1 to 15 percent. Areas are irregular in shape and are 200 to 1,000 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 30 percent Delnorte very gravelly fine sandy loam, 3 to 15 percent slopes, 30 percent Cave gravelly very fine sandy loam, 1 to 9 percent slopes, and 20 percent Tencee very gravelly fine sandy loam, 1 to 9 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Nickel soils on ridges and side slopes, Mimbres soils in drainageways, Simona soils intermingled throughout the unit, and arroyos. Included areas make up about 20 percent of the total acreage.

The Delnorte soil is shallow and well drained. It formed in mixed alluvium. Typically, the surface layer is light yellowish brown very gravelly fine sandy loam and very gravelly loam about 10 inches thick. The underlying material to a depth of 14 inches is very pale brown very gravelly loam, the next 12 inches is laminated and indurated caliche, and the next layer to a depth of 60 inches or more is hard nodules of caliche that are weakly cemented together.

Permeability of the Delnorte soil is moderate. Available water capacity is very low. Effective rooting depth is to

the indurated layer, or 6 to 20 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Cave soil is shallow and well drained (fig. 6). It formed in mixed alluvium. Typically, the surface layer is brown gravelly very fine sandy loam about 4 inches thick. The underlying material to a depth of 12 inches is light brown gravelly loam, the next 18 inches is laminated and indurated gravel and caliche, and the lower part to a depth of 60 inches or more is hard nodules of gravel and caliche weakly cemented together.

Permeability of the Cave soil is moderate. Available water capacity is very low. Effective rooting depth is to the indurated layer, or 4 to 20 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Tencee soil is shallow and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown very gravelly fine sandy loam about 2 inches thick. The upper part of the underlying material is light brown and pink very gravelly loam about 14 inches thick, and the lower part to a depth of 60 inches or more is pinkish white laminated and indurated caliche.

Permeability of the Tencee soil is moderate. Available water capacity is very low. Effective rooting depth is to the indurated layer, or 6 to 20 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, wildlife habitat, and urban development.

The potential natural plant community on the Delnorte and Tencee soils in this unit is characterized by bush muhly, black grama, creosotebush, and mariola. The

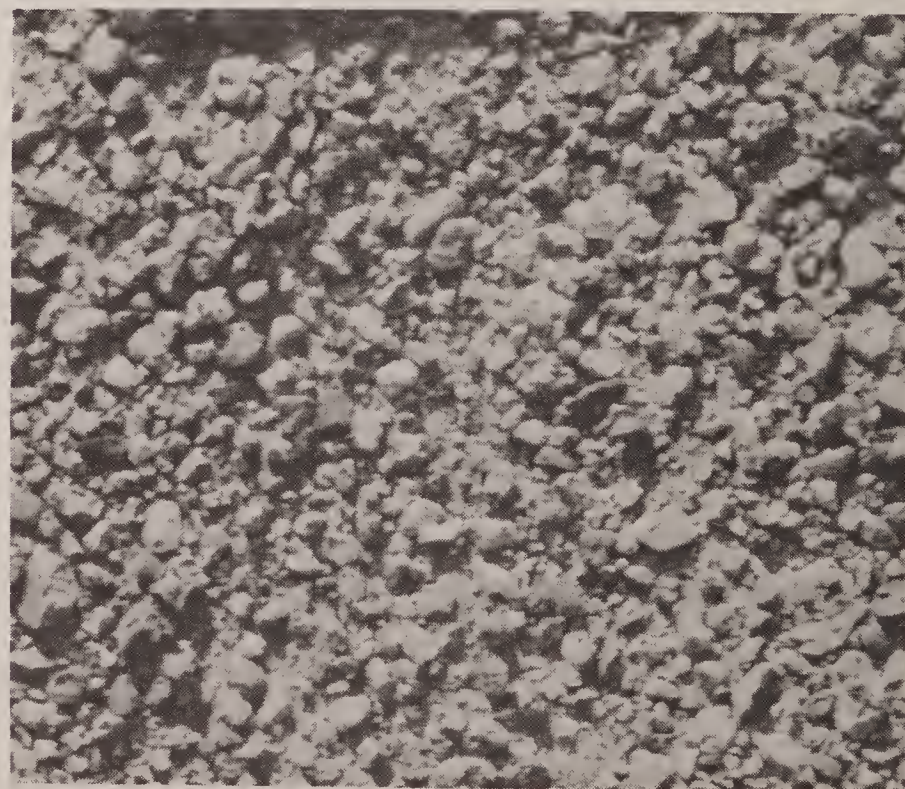


Figure 6.—Desert pavement in an area of Cave gravelly fine sandy loam.



average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, mariola, broom snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

The potential natural plant community on the Cave soil in this unit is dominated by black grama. Blue grama, bush muhly, cane bluestem, winterfat, and scattered forbs are present in smaller amounts. Scattered yucca plants are in some areas, but the overall appearance of the plant community is strongly that of open grassland. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 325 pounds in unfavorable years. As the plant community deteriorates, black grama, blue grama, bush muhly, cane bluestem, and winterfat decrease, and there is an increase in threeawn, fluffgrass, broom snakeweed, annual forbs, and annual grasses. American tarbush, creosotebush, and mesquite invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding, mechanical brush control, and stock ponds because of the low rainfall, the hazard of water erosion, and shallow soil depth over cemented gravel or caliche. Fences and pipelines for providing water for livestock are difficult to install on the soils in this unit because of the shallow depth to the cemented gravel or caliche.

This unit is poorly suited to urban development. The main limitations are the content of coarse fragments, high lime content, the depth to the cemented pan, and slope in some areas. Lawns and small shrubs can be grown satisfactorily if the surface is covered with 8 to 10 inches of topsoil and the soil is irrigated.

**31—Dona Ana complex, hummocky.** This map unit is on piedmonts. Slope is 1 to 5 percent. Areas are irregular in shape and are 150 to 640 acres in size. The native vegetation is mainly grass and scattered shrubs and forbs. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 35 percent Dona Ana loamy fine sand, 1 to 5 percent slopes, and 35 percent Dona Ana very fine sandy loam, 1 to 5 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit and making up about 15 percent of the area are active sand dunes 18 to 60 inches high blown up around woody plants and smaller amounts of Berino and Reakor soils intermingled with the Dona Ana soil. Also included and making up about 15 percent of the unit are Simona, Tencee, and Tres Hermanos soils

on low ridges and small areas of deep silty clay loam in narrow drainageways.

The Dona Ana loamy fine sand is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is reddish brown loamy fine sand about 12 inches thick. Below this is a buried surface layer of reddish brown very fine sandy loam about 4 inches thick. The subsoil is reddish brown sandy clay loam about 14 inches thick. The substratum to a depth of 60 inches or more is pink, weakly cemented sandy clay loam.

Permeability of the Dona Ana loamy fine sand is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

The Dona Ana very fine sandy loam is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown very fine sandy loam about 6 inches thick. The subsoil is reddish brown sandy clay loam about 16 inches thick. The upper 18 inches of the substratum is pinkish white, weakly cemented loam that is about 15 percent hard caliche fragments, and the lower part to a depth of 60 inches or more is pink fine sandy loam.

Permeability of the Dona Ana very fine sandy loam is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, mesa dropseed, sand dropseed, bush muhly, and soap tree yucca. Forbs and low-growing shrubs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 650 pounds per acre in favorable years to 225 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in dropseed, threeawn, broom snakeweed, and annual forbs. Severe deterioration is characterized by an intense infestation of mesquite and creosotebush and formation of dunes and barren or nearly barren interdunal areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**32—Dona Ana-Tres Hermanos association, gently sloping.** This map unit is on piedmonts. Slope is 1 to 9 percent. Areas are irregular in shape and are 200 to 640



acres in size. The native vegetation is mainly grass and shrubs. Elevation is 4,050 to 5,500 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 50 percent Dona Ana very fine sandy loam, 1 to 9 percent slopes, and 30 percent Tres Hermanos gravelly fine sandy loam, 1 to 9 percent slopes. The Dona Ana soil commonly is in broad areas, and the Tres Hermanos soil is on low ridges and in areas that slope to drainageways.

Included in this unit are small areas of Chamberino and Nickel soils that are generally on the steeper side slopes adjoining drainageways and on the higher ridges, Stellar soils in slight swales, and deep soils that have a coarse-textured or fine-textured subsoil and are in drainageways. Included areas make up about 20 percent of the total acreage.

The Dona Ana soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown very fine sandy loam 3 inches thick. From 10 to 30 percent of the surface is covered with gravel. The subsoil is light brown sandy clay loam about 15 inches thick. The upper 11 inches of the substratum is pink sandy clay loam that commonly is weakly cemented, and the lower part to a depth of 60 inches or more is light brown loam.

Permeability of the Dona Ana soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Tres Hermanos soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is light brown gravelly fine sandy loam about 3 inches thick. The subsoil is reddish brown gravelly sandy clay loam about 23 inches thick. The substratum to a depth of 60 inches or more is light reddish brown very gravelly sandy clay loam.

Permeability of the Tres Hermanos soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on the Dona Ana soil is characterized by black grama, bush muhly, tobosa, cane bluestem, sand dropseed, and threeawn. The average annual production of air-dry vegetation ranges from 675 pounds per acre in favorable years to 300 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in tobosa, threeawn, fluffgrass, dropseed, broom snakeweed, and annual forbs. Creosotebush and mesquite invade in some areas.

The potential natural plant community on the Tres Hermanos soil is characterized by bush muhly, black grama, and creosotebush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, mariola, broom snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, chemical brush control, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of water erosion and soil blowing.

**33—Eba very gravelly loam, gently sloping.** This deep, well drained soil is on piedmonts. It formed in gravelly mixed alluvium. Slope is 1 to 7 percent. Areas are irregular in shape and are 200 to 800 acres in size. The native vegetation is mainly grass. Elevation is 4,100 to 5,700 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown very gravelly loam about 3 inches thick. The subsoil is reddish brown very gravelly clay loam about 18 inches thick. The upper 8 inches of the substratum is pink very gravelly clay loam that is weakly cemented and the lower part to a depth of 60 inches or more is light brown very gravelly clay loam. In some small areas the surface layer is gravelly fine sandy loam, gravelly clay loam, or very gravelly clay loam.

Included in this unit are small areas of Nickel and Tres Hermanos soils interspersed throughout the unit. Included areas make up about 15 percent of the total acreage.

Permeability of this Eba soil is slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, bush muhly, cane bluestem, sideoats grama, blue grama, yucca, sotol, and ocotillo. The average annual production of air-dry vegetation ranges from 675 pounds per acre in favorable years to 275 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, cane bluestem, sideoats grama, and blue grama decrease, and there is an increase in fluffgrass, threeawn, tobosa, broom snakeweed, creosotebush, and annual forbs.



This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of water erosion.

**34—Elbutte-Courthouse complex, moderately rolling.** This map unit is in nearly level to rolling areas on side slopes. Slope is 1 to 15 percent. Areas are irregular in shape and are 100 to 640 acres in size. The native vegetation is mainly grass and shrubs. Elevation is 4,400 to 5,500 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 170 to 210 days.

This unit is 45 percent Elbutte gravelly clay loam, 1 to 15 percent slopes, and 35 percent Courthouse gravelly fine sandy loam, 1 to 15 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of shallow and moderately deep soils that have a clay loam or clay subsoil over sandstone. These areas are along the eastern border of the mapped areas. They make up about 15 percent of the unit. Also included are deep clay loam in swales, sandstone and shale outcrops, and Stellar soils in small pockets where side slopes are nearly level. Included areas make up about 20 percent of the total acreage.

The Elbutte soil is shallow and well drained. It formed in material derived dominantly from shale with some influence of sandstone. Typically, the surface layer is light yellowish brown gravelly clay loam about 3 inches thick. The subsoil is light olive brown clay loam about 7 inches thick. The underlying material to a depth of 14 inches is light olive brown extremely shaly silty clay loam. Light olive brown shale is at a depth of 14 inches.

Permeability of the Elbutte soil is slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Courthouse soil is shallow and well drained. It formed in material derived dominantly from sandstone with some influence of shale. Typically, the surface layer is pale brown gravelly fine sandy loam about 2 inches thick. The upper 3 inches of the underlying material is brown gravelly sandy clay loam, and the lower part to a depth of 8 inches is brown gravelly clay loam. Sandstone is at a depth of 8 inches. In some small areas the surface layer is stony loam.

Permeability of the Courthouse soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the

hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

This unit supports a plant community that includes tobosa, black grama, bush muhly, and, in some areas, creosotebush, but it has not reached the state of dynamic equilibrium characteristic of potential natural plant communities. For this reason, onsite investigation is needed to determine suitable management for the vegetation on this unit.

**35—Glendale loam.** This deep, well drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown loam about 10 inches thick. The underlying material to a depth of 60 inches or more is light brown and brown, stratified silt loam and silty clay loam. In some small areas the surface layer is clay loam.

Included in this unit are small areas of Anapra and Harkey soils in positions similar to those of the Glendale soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Glendale soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. Some small areas within levees of the Rio Grande are subject to flooding.

This unit is used for irrigated crops and urban development.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Because of the moderately slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage crops. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is suited to urban development. The main limitations are the clayey texture of the soil and shrink-swell potential. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff



away from the building help to prevent structural damage because of shrinking and swelling.

**36—Glendale clay loam.** This deep, well drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 80 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is grayish brown clay loam about 12 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and grayish brown, stratified silt loam and silty clay loam. In some small areas the surface layer is loam or silty clay loam.

Included in this unit are small areas of Anapra, Armijo, Belen, and Harkey soils that are in positions similar to those of the Glendale soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Glendale soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated pasture, cultivated crops, and urban development.

This unit is suited to all climatically adapted crops (fig. 7). Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Because of the moderately slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage crops. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is suited to urban development. The main limitations are the clayey texture of the soil and shrink-swell potential. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the building help to prevent structural damage because of shrinking and swelling.

**37—Glendale-Gila complex, nearly level.** This map unit is on alluvial flood plains. Slope is 0 to 3 percent. Areas are elongated and are 50 to 200 acres in size. The native vegetation is mainly grass. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 68

degrees F, and the average frost-free period is 180 to 220 days.

This unit is about 40 percent Glendale silty clay loam, 0 to 3 percent slopes, and 35 percent Gila very fine sandy loam, 0 to 3 percent slopes. The percent of each varies considerably from one location to another.

Included in this unit are small areas of Arizo, Brazito, Canutio, and Vinton soils on flood plains. Also included are arroyos. Included areas make up about 25 percent of the total acreage.

The Glendale soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is very pale brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is pale brown and very pale brown, stratified silty clay loam, clay loam, and fine sandy loam, but it averages silty clay loam. In some areas the surface layer is silt loam or clay loam, and the soil is saline and has a high water table.

Permeability of the Glendale soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. Areas of this soil that are not protected are subject to occasional, brief periods of flooding during June through September in 2 years out of 5.

The Gila soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is pale brown very fine sandy loam about 8 inches thick. The underlying material to a depth of 60 inches or more is pale brown, stratified silt loam, loam, very fine sandy loam, and fine sandy loam, but it averages loam. In some small areas the surface layer is silt loam or clay loam, and the soil is saline and has a high water table.

Permeability of the Gila soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. Areas of this soil that are not protected are subject to occasional, brief periods of flooding during June through September in 2 years out of 5.

This unit is used for grazing livestock and wildlife habitat. It can be used for irrigated crops and urban development where protected from flooding.

The potential natural plant community on this unit is characterized by giant sacaton. The average annual production of air-dry vegetation ranges from 3,500 pounds per acre in favorable years to 1,800 pounds in unfavorable years. If natural overflow is prevented for long periods of time, either as a result of gullying or manmade structures, giant sacaton decreases or disappears. Such plants as saltcedar, inland saltgrass, fourwing saltbush, and seepwillow increase or invade, especially where the water table is at a depth of less than 60 inches. Prolonged excessive grazing can also cause the dominant plants in the potential natural plant community to decrease.





Figure 7.—Grain sorghum in an area of Glendale clay loam.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**38—Goldust very gravelly clay loam, very steep.**

This deep, well drained soil is on dissected piedmonts (fig. 8). It formed in mixed alluvium. Slope is 5 to 55 percent. Areas are irregular in shape and are 200 to 840 acres in size. The native vegetation is mainly grass. Elevation is 5,200 to 6,500 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

Typically, the surface layer is dark gray very gravelly clay loam about 8 inches thick. The upper 11 inches of

the subsoil is brown gravelly clay, and the lower 13 inches is brown very gravelly clay. The substratum to a depth of 60 inches or more is pink and pinkish gray very gravelly sandy clay loam. In some small areas the surface layer is very cobbly clay loam or stony clay loam.

Included in this unit are small areas of deep very gravelly clay loam that is strongly effervescent in the substratum; deep, colluvial stony loam on steep side slopes below areas of rock outcrop; and deep clay loam in drainageways. Also included at the higher elevations on north-facing side slopes along the west boundary of the survey area are areas of soils that are darker in color. These areas make up about 5 percent of the unit. The included areas make up about 15 percent of the total acreage.

Permeability of this Goldust soil is slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is moderate to rapid, and the





Figure 8.—An area of Goldust very gravelly clay loam, very steep.

hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, blue grama, sideoats grama, and New Mexico feathergrass. Scattered shrubs and halfshrubs are in some areas, but the overall appearance of the plant community is strongly that of open grassland. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 550 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, and New Mexico feathergrass decrease, and there is an increase in threeawn, ring muhly, tobosa, halfshrubs, and annual forbs.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. It has

limited suitability for mechanical brush control and rangeland seeding because of the steepness of slope and the hazard of erosion. Pipelines for providing water for livestock are difficult to install on this unit because of gravel and steepness of slope.

**39—Goldust-Pena association, hilly.** This map unit is on dissected piedmonts. Slope is 5 to 35 percent. Areas are irregular in shape and are 200 to 840 acres in size. The native vegetation is mainly grass. Elevation is 6,300 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 47 to 55 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 45 percent Goldust gravelly sandy clay loam, 5 to 35 percent slopes, and 35 percent Pena gravelly sandy loam, 5 to 35 percent slopes. The Goldust soil is mostly on north-facing side slopes, and the Pena soil is generally on south-facing side slopes.



Included in this unit are small areas of Manzano soils on small valley flood plains, Ildefonso soils on some south-facing side slopes at the lower elevations, Scholle soils in some nearly level areas, and deep clay loam in drainageways. Also included at the higher elevations on north-facing side slopes along the west boundary of the survey area are areas of soils that are darker in color. These areas make up about 5 percent of the unit. The included areas make up about 20 percent of the unit.

The Goldust soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown gravelly sandy clay loam about 6 inches thick. The subsoil is dark brown and brown very gravelly clay loam, very gravelly clay, and very gravelly sandy clay about 34 inches thick. The substratum to a depth of 60 inches or more is stratified, light brown very gravelly sandy clay loam.

Permeability of the Goldust soil is slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is moderate to rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Pena soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is dark grayish brown gravelly sandy loam about 2 inches thick. The subsoil is about 23 inches thick. It is dark grayish brown very gravelly clay loam in the upper part and grayish brown and pale brown very gravelly loam in the lower part. The substratum to a depth of 60 inches or more is white very gravelly loam and very pale brown very gravelly sandy loam.

Permeability of the Pena soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, sideoats grama, blue grama, and shrubs such as sacahuista and oak. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 375 pounds in unfavorable years. If the potential plant community deteriorates, black grama, sideoats grama, and blue grama decrease, and there is an increase in threeawn, dropseed, shrubs, cactus, and annual forbs. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the steepness of slope and the hazard of water erosion.

**40—Harkey fine sandy loam.** This deep, well drained soil is on flood plains. It formed in mixed alluvium. Slope

is 0 to 1 percent. Areas are irregular in shape and are 15 to 100 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The underlying material to a depth of 60 inches or more is stratified, grayish brown and light brownish gray very fine sandy loam and silt loam. In some small areas the surface layer is clay or loam.

Included in this unit are small areas of Agua, Anthony, Brazito, Glendale, and Vinton soils that are in positions similar to those of the Harkey soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Harkey soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops and urban development.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is well suited to urban development. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

**41—Harkey loam.** This deep, well drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 20 acres in size. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is pale brown loam about 12 inches thick. The underlying material to a depth of 60 inches or more is pale brown and yellowish brown, stratified very fine sandy loam and silt loam. In some small areas the surface layer is clay loam, fine sandy loam, silt loam, or gravelly loam.

Included in this unit are small areas of Agua, Anthony, Glendale, and Vinton soils that are in positions similar to those of the Harkey soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Harkey soil is moderate. Available water capacity is very high. Effective rooting depth is 60



inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops and urban development.

This unit is suited to all climatically adapted crops (figs. 9 and 10). Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is well suited to urban development. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

**42—Harkey loam, saline and alkali.** This deep, moderately well drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 50 to 100 acres in size. Elevation is 4,100 to 4,200 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown loam that is moderately salt- and alkali-affected and is about 11 inches thick. The underlying material to a depth of 60 inches or more is stratified. It averages very pale brown very fine sandy loam. In some small areas the surface layer is clay loam or fine sandy loam.

Included in this unit are small areas of saline and alkali Anthony and Glendale soils that are in positions similar to those of the Harkey soil. Included areas make up about 15 percent of the total acreage.



Figure 9.—Flood irrigation of chili pepper plants, a major cash crop, in an area of Harkey loam.





Figure 10.—Double cropping in an area of Harkey loam, a common practice until pecan orchards are in production.

Permeability of this Harkey soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. The soil is moderately salt- and sodium-affected. Surface crusting and sealing are common. A fluctuating water table commonly is at a depth of about 4 to 5 feet.

This unit is used for irrigated pasture, cultivated crops, and urban development.

This unit is suited to crops such as barley, grain sorghum, grass, legumes, and cotton. It is limited mainly by salt accumulation, which inhibits plant growth. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Application of gypsum or sulfur reduces the sodium concentrations and increases the permeability. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is poorly suited to urban development. The main limitation is wetness as a result of the high water table. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Salt tolerant plants are desirable.

**43—Harkey clay loam.** This deep, well drained soil is on flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 120 acres in size. Elevation is 4,100 to 4,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown clay loam about 15 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and pale brown, stratified loam and silt loam. In some small areas the surface layer is loam.

Included in this unit are small areas of Agua, Anthony, and Glendale soils that are in positions similar to those of the Harkey soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Harkey soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for irrigated crops.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Good



management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**44—Holloman fine sandy loam, moderately undulating.** This shallow, well drained soil is on the floor of an ancient lake. It formed in alluvium and residuum derived dominantly from gypsum. Slope is 0 to 5 percent. Areas are irregular in shape and are 100 to 800 acres in size. The native vegetation is mainly grass. Elevation is 4,700 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is about 2 inches thick. It is light brown fine sandy loam that is about 45 percent gypsum. The underlying material is about 10 inches thick. It is pink fine sandy loam and very fine sandy loam and is 65 to 75 percent fine gypsum crystals. Very hard to extremely hard material that is more than 85 percent fine gypsum crystals is at a depth of 12 inches.

Included in this unit are small areas of exposed gypsum, a moderately deep fine sandy loam that is over gypsum and is nearly level in some areas, and deep soils in swales and drainageways. Included areas make up about 20 percent of the total acreage.

Permeability of this Holloman soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by alkali sacaton, gyp grama, black grama, gyp dropseed, coldenia, Mormon-tea, and a few annual forbs. The average annual production of air-dry vegetation ranges from 600 pounds per acre in favorable years to 200 pounds in unfavorable years. As the plant community deteriorates, black grama and alkali sacaton decrease, and there is an increase in gyp dropseed, coldenia, and annuals and in barren areas.

This unit is suited to such rangeland management practices as fencing, livestock water developments, proper grazing use, and planned grazing systems. It has limited suitability for practices such as mechanical brush control and rangeland seeding because of the low rainfall and the hazard of soil blowing. The unit is poorly suited to steel pipelines for providing livestock water because of corrosivity.

**45—Holloman Variant clay loam, moderately undulating.** This shallow, moderately well drained soil is on the floor of an ancient lake. It formed in alluvium and residuum derived dominantly from gypsum. Slope is 0 to 5 percent. Areas are irregular in shape and are 50 to 320 acres in size. The native vegetation is mainly grass.

Elevation is 4,700 to 4,900 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is moderately saline, brown and dark brown clay loam that has a crusty surface and contains common fine salt crystals. It is about 3 inches thick. The underlying material is brown loam and white very fine sandy loam about 10 inches thick over gypsum. The upper part of the gypsum layer is very hard and weakly cemented.

Included in this unit are small areas of exposed gypsum and Holloman fine sandy loam. Included areas make up about 20 percent of the total acreage.

Permeability of this Holloman Variant soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to rare periods of flooding. A seasonal high water table is at a depth of 4 to 8 feet in most years. The soil is moderately saline.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by alkali sacaton, fourwing saltbush, seepweed, and vine-mesquite. Annual forbs and less desirable grasses may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 400 pounds in unfavorable years. As the plant community deteriorates, alkali sacaton and vine-mesquite decrease, and there is an increase in iodinebush, seepweed, coldenia, and various annuals. Mesquite and saltcedar invade in some areas.

This unit is suited to such rangeland management practices as fencing, livestock water developments, proper grazing use, and planned grazing systems. It has limited suitability for practices such as mechanical brush control and rangeland seeding because of the low rainfall. The unit is poorly suited to steel pipelines for providing livestock water because of corrosivity.

**46—Ildefonso-Scholle association, hilly.** This map unit is on piedmonts. Slope is 1 to 35 percent. Areas are irregular in shape and are 200 to 1,000 acres in size. The native vegetation is mainly grass. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 45 percent Ildefonso very gravelly loam, 1 to 35 percent slopes, and 35 percent Scholle very gravelly loam, 1 to 15 percent slopes. The Ildefonso soil generally is in the more sloping areas and on ridges and



side slopes of arroyos, and the Scholle soil generally is in the less sloping areas.

Included in this unit are small areas of deep soils that are gravelly loam and have less than 35 percent rock fragments, have a loamy or clayey subsoil, or are darker in color. Also included are small areas of deep sandy loam or clay loam in swales and drainageways, Rock outcrop, and Badland. Included in the unit at higher elevations on north-facing side slopes along the western boundary of the survey area are soils that are darker in color. These areas make up about 5 percent of the unit. The included areas make up about 20 percent of the total acreage.

The Ildefonso soil is deep and well drained. It formed in mixed gravelly alluvium. Typically, the surface layer is brown very gravelly loam about 4 inches thick. The subsoil is light brown very gravelly loam about 11 inches thick. The substratum to a depth of 60 inches or more is light brown and pink very gravelly loam.

Permeability of the Ildefonso soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Scholle soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown very gravelly loam about 5 inches thick. The subsoil is reddish brown gravelly clay loam about 22 inches thick. The substratum to a depth of 60 inches or more is pink and light brown very gravelly clay loam.

Permeability of the Scholle soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, sideoats grama, New Mexico feathergrass, blue grama, Hall panicum, and scattered halfshrubs. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 550 pounds in unfavorable years. If the potential plant community deteriorates, black grama, New Mexico feathergrass, and sideoats grama decrease, and there is an increase in blue grama, threeawn, fluffgrass, broom snakeweed, ring muhly, and annual forbs. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the content of gravel, steepness of slope in some areas, and the hazard of water erosion.

**47—La Fonda loam, gently sloping.** This deep, well drained soil is on an alluvial flood plain terrace. It formed in mixed alluvium with a strong influence of red sandstone and shale. Slope is 0 to 5 percent. Areas are irregular in shape and are 60 to 200 acres in size. The native vegetation is mainly grass. Elevation is 5,800 to 6,700 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 53 to 58 degrees F, and the average frost-free period is 140 to 180 days.

Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown and light reddish brown clay loam about 36 inches thick. The substratum to a depth of 60 inches or more is reddish brown silty clay loam. In some small areas the surface layer is silt loam.

Included in this unit are small areas of deep soils that are loam and have a silty clay loam or fine sandy loam subsoil or are gravelly throughout. These areas are in positions similar to those of the La Fonda soil and in flooded swales. Included areas make up about 20 percent of the total acreage.

Permeability of this La Fonda soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by blue grama, sideoats grama, tobosa, bottlebrush squirreltail, and black grama. The average annual production of air-dry vegetation ranges from 1,000 pounds per acre in favorable years to 425 pounds in unfavorable years. As the plant community deteriorates, sideoats grama, bottlebrush squirreltail, and blue grama decrease and there is an increase in tobosa, ring muhly, shrubs, cactus, and annual forbs. Mesquite and juniper invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, brush management, rangeland seeding, and planned grazing systems.

**48—Largo very fine sandy loam, gently sloping.** This deep, well drained soil is in swales and narrow drainageways. It formed in mixed alluvium. Slope is 1 to 5 percent. Areas are elongated and are 50 to 250 acres. The native vegetation is mainly grass. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is reddish brown very fine sandy loam about 3 inches thick. The underlying material to a depth of 60 inches or more is reddish brown silty clay loam. In some small areas the surface layer is loam.



Included in this unit are small areas of deep soils, scattered throughout the unit, that have loamy underlying material and that in some areas have a gravelly surface layer, Dona Ana and Tres Hermanos soils on small benches of uplands, arroyos, and small areas of shallow soils over cemented caliche on low ridges. These included areas make up about 20 percent of the total acreage.

Permeability of this Largo soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 2 years out of 5.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by either giant sacaton or alkali sacaton. The estimated annual production of air-dry vegetation ranges from 3,500 pounds per acre in favorable years to 1,800 pounds in unfavorable years. Deterioration of the potential plant community is associated with gullying. It is characterized by a substantial decrease in plant production. Tobosa, feather fingergrass, threeawn, burrograss, and annual forbs replace the dominant plants in the potential plant community under these conditions. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of soil blowing and water erosion.

**49—Largo-Sotim association, gently sloping.** This map unit is on alluvial fans and flood plains, in swales, and on terraces, mostly in the south-central part of the survey area. Slope is 1 to 5 percent. Areas are elongated and are 100 to 480 acres. The native vegetation is mainly grass. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 55 percent Largo silt loam, 1 to 5 percent slopes, and 30 percent Sotim silty clay loam, 1 to 5 percent slopes. Generally, the Sotim soil is slightly higher on the landscape than is the Largo soil.

Included in this unit are small areas of Marconi soils on terminal fans and basin floors and Dona Ana, Tres Hermanos, and Tencee soils on small ridges and upland benches. Included areas make up about 15 percent of the total acreage.

The Largo soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light reddish brown silt loam about 4 inches thick. The

underlying material to a depth of 60 inches or more is reddish brown silty clay loam.

Permeability of the Largo soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is subject to frequent, very brief periods of flooding during June through September in 3 years out of 5.

The Sotim soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light reddish brown silty clay loam about 3 inches thick. The subsoil is reddish brown and light reddish brown clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is pink clay loam and loam. In some small areas the surface layer is very fine sandy loam.

Permeability of the Sotim soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 2 years out of 5.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by tobosa, vine-mesquite, alkali sacaton, and scattered woody plants. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 600 pounds in unfavorable years. Deterioration of the potential plant community is commonly associated with gullying. It is characterized by a substantial decrease in plant production. Burrograss, threeawn, and annuals replace the dominant plants in the potential plant community under these conditions. Mesquite and American tarbush invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**50—Lehmans-Luzena association, very steep.** This map unit is on hills and low mountains. Slope is 5 to 55 percent. Areas are irregular in shape and are 80 to 640 acres in size. The native vegetation is mainly grass and scattered shrubs. Elevation is 4,200 to 6,400 feet. The average annual precipitation is 8 to 13 inches, the average annual air temperature is 55 to 62 degrees F, and the average frost-free period is 160 to 190 days.

This unit is 35 percent Lehmans very stony clay loam, 5 to 55 percent slopes, and 25 percent Luzena cobbly loam, 5 to 55 percent slopes. Also in this unit is about 20



percent Rock outcrop. The Lehmans soil is mainly on the warmer, south-facing side slopes and at the lower elevations, and the Luzena soil is on the cooler, north-facing side slopes and at the higher elevations. Rock outcrop consists of ledges, hilltops, and scarps.

Included in this unit are small areas of soils that have more than 35 percent rock fragments throughout the profile or have a loamy subsoil and moderately deep to deep cobbly and stony colluvial soils on the lower toe slopes, in canyons, in areas of rockslides, and in arroyos. Included areas make up about 20 percent of the total acreage.

The Lehmans soil is shallow and well drained. It formed in material derived dominantly from acid igneous rock. About 55 percent of the surface is covered with gravel, cobbles, and stones. Typically, the surface layer is brown very stony clay loam about 3 inches thick. The subsoil to a depth of 12 inches is reddish brown and brown stony clay loam. Bedrock is at a depth of 12 inches.

Permeability of the Lehmans soil is slow. Available water capacity is very low. Effective rooting depth is 7 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Luzena soil is shallow and well drained. It formed in material derived dominantly from acid igneous rock. About 40 percent of the surface is covered with cobbles, gravel, and stones. Typically, the surface layer is brown cobbly loam about 3 inches thick. The subsoil is dark brown cobbly clay loam about 11 inches thick. Bedrock is at a depth of 14 inches.

Permeability of the Luzena soil is slow. Available water capacity is very low. Effective rooting depth is 7 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on the Lehmans soil is characterized by black grama, bush muhly, and sideoats grama. Sotol, agave, ocotillo, and feather dalea may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 325 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, and sideoats grama decrease, and there is an increase in threeawn, fluffgrass, tobosa, shrubs, and annual forbs.

The potential natural plant community on the Luzena soil is characterized by sideoats grama, blue grama, cane bluestem, Arizona cottontop, and species of muhly. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 575 pounds in unfavorable years. As the plant community deteriorates, sideoats grama, cane bluestem, and Arizona cottontop decrease, and there is an

increase in threeawn, blue grama, broom snakeweed, and shrubs, including some juniper and oak.

This unit is suited to such rangeland management practices as proper grazing use and planned grazing systems. It is not suited to such practices as mechanical brush control and rangeland seeding because of the shallow depth to bedrock, steepness of slope, and stoniness. Fences and pipelines for providing water for livestock are difficult to install on the soils in this unit because of stoniness, steepness of slope, and depth to bedrock.

**51—Lithic Haplargids, moderately sloping.** These shallow, well drained soils are on piedmonts. They formed in eolian sediment. Slope is 1 to 15 percent. Areas are irregular in shape and are 180 to 500 acres in size. The native vegetation is mainly grass. Elevation is 4,700 to 5,100 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 180 to 220 days.

A sample profile of Lithic Haplargids has a surface layer of brown fine sandy loam about 3 inches thick. The subsoil is strong brown sandy clay loam about 6 inches thick. The substratum is light brown very gravelly sandy loam about 3 inches thick over weathered sandstone 3 inches thick. Hard sandstone is at a depth of 15 inches.

Included in this unit are small areas of Berino and Dona Ana soils on toe slopes and side slopes, Rock outcrop on hilltops and side slopes, and Cacique, Cruces, and Simona soils on low ridges at the lower elevations. Included areas make up about 20 percent of the total acreage.

Permeability of the Lithic Haplargids is slow to moderate. Available water capacity is very low to low. Effective rooting depth is 7 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, bush muhly, cane bluestem, and various woody plants. The average annual production of air-dry vegetation ranges from 675 pounds per acre in favorable years to 275 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, and cane bluestem decrease, and there is an increase in threeawn, broom snakeweed, annual forbs, and woody plants. Eventually, annuals and woody plants dominate the plant community.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, and planned grazing systems. It is not suited to practices such as mechanical brush control and rangeland seeding because of the shallow depth to sandstone, the hazard of soil blowing, and the low rainfall. Practices that facilitate rangeland management



such as fences and pipelines for providing water for livestock are difficult to install on the soils in this unit because of the shallow depth to sandstone.

**52—Lozier-Rock outcrop association, hilly.** This map unit is on hills (fig. 11). Slope is 5 to 25 percent. Areas are irregular in shape and are 160 to 480 acres in size. The native vegetation is mainly grass and scattered shrubs and cacti. Elevation is 4,100 to 6,000 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 220 days.

This unit is 40 percent Lozier very stony loam, 5 to 25 percent slopes, and 35 percent Rock outcrop, 5 to 25 percent slopes. The Lozier soil is on small ridges, on hilltops, between limestone ledges, and in saddles. The Rock outcrop is on protruding ridges, hill crests, ledges, and steep side slopes.

Included in this unit are small areas of deep and moderately deep, very stony colluvial and alluvial soils on toe slopes, below rock ledges, and on steep side slopes. Also included are rock outcroppings of shale, sandstone, and acid igneous rock and areas of Nickel and Tencee soils rimming the base of hillsides. Included areas make up about 25 percent of the total acreage.

The Lozier soil is shallow and well drained. It formed in material derived dominantly from limestone. Typically, the surface layer is light brown very stony loam about 2 inches thick. The underlying material to a depth of 9 inches is very stony loam. It is light brown in the upper part and pink in the lower part. Limestone is at a depth of 9 inches.

Permeability of the Lozier soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.



Figure 11.—An area of Lozier-Rock outcrop association, hilly.



Rock outcrop consists of areas of exposed limestone and areas that have less than 4 inches of soil material over bedrock.

This unit is used for livestock grazing, watershed, wildlife habitat, and urban development.

The potential natural plant community on the Lozier soil is characterized by black grama, bush muhly, sideoats grama, green sprangletop, and New Mexico feathergrass. Woody plants and halfshrubs include ocotillo, agave, sotol, feather dalea, and mariola. Scattered juniper is on north- and east-facing side slopes in some areas, and a variety of halfshrubs and forbs is scattered throughout areas of this soil. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 325 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, sideoats grama, green sprangletop, and New Mexico feathergrass decrease, and there is an increase in threeawn, fluffgrass, cactus, broom snakeweed, and annual forbs. Creosotebush invades in some areas.

The Lozier soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. The soil is not suited to such practices as mechanical brush control because of the shallow depth to the limestone and steepness of slope. Fences and pipelines for providing water for livestock are difficult to install on the Lozier soil because of the shallow depth to the limestone.

This unit is poorly suited to urban development. The main limitations are slope, depth to bedrock, and the areas of Rock outcrop.

### **53—Luzena-Rock outcrop association, very steep.**

This map unit is on hills and low mountains (fig. 12). Slope is 5 to 55 percent. Areas are irregular in shape and are 160 to 800 acres in size. The native vegetation is mainly grass and scattered shrubs and trees. Elevation is 5,300 to 7,800 feet. The average annual precipitation is 11 to 15 inches, the average annual air temperature is 53 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 50 percent Luzena gravelly loam, 5 to 55 percent slopes, and 25 percent Rock outcrop, 5 to 55 percent slopes. The Luzena soil is between ledges, in saddles, and on side slopes. Rock outcrop consists of peaks, ledges, and scarps.

Included in this unit are small areas of shallow soils that have a gravelly loam subsoil and are in positions similar to those of the Luzena soil, shallow soils that have more than 35 percent coarse fragments and are on the steeper side slopes, areas of rockslides, and arroyos. Included areas make up about 25 percent of the total acreage.

The Luzena soil is shallow and well drained. It formed in material derived dominantly from acid igneous rock. About 30 percent of the surface is covered with stones,

cobbles, and gravel. Typically, the surface layer is brown gravelly loam about 2 inches thick. The subsoil to a depth of 14 inches is brown and reddish brown gravelly clay loam and has some cobbles and stones throughout. Rhyolite bedrock is at a depth of 14 inches. In some small areas the surface layer is stony loam or cobbly loam.

Permeability of the Luzena soil is slow. Available water capacity is very low. Effective rooting depth is 7 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Rock outcrop consists of areas of exposed acid igneous rock that is dominantly rhyolite and andesite, except in the southwest corner of the survey area, where it is dominantly tuff. It also consists of areas that have less than 4 inches of soil material over bedrock.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on the Luzena soil is characterized by sideoats grama, blue grama, little bluestem, cane bluestem, Arizona cottontop, plains lovegrass, and species of muhly. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 575 pounds in unfavorable years. As the plant community deteriorates, sideoats grama, little bluestem, and cane bluestem decrease, and there is an increase in threeawn, blue grama, broom snakeweed, and shrubs including juniper.

In some areas of these soils at higher elevations or on north- and east-facing side slopes, pinyon and juniper are naturally dominant. In these areas the pinyon and juniper canopy exceeds 25 percent. Scattered ponderosa pine is present in some places. Among the understory shrubs are oak, sacahuista, skunkbush sumac, and hairy mountainmahogany. Grasses include blue grama, pinyon ricegrass, and species of muhly.

The Luzena soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. The soil is not suited to such rangeland management practices as mechanical brush control and rangeland seeding because of the shallow depth to bedrock, cobbles, and steepness of slope. Pipelines for providing water for livestock and fences are difficult to install on this soil because of cobbles, steepness of slope, and depth to bedrock.

**54—Manzano loam, gently sloping.** This deep, well drained soil is on alluvial flood plains and alluvial fans. It formed in mixed alluvium. Slope is 0 to 5 percent. Areas are elongated and are 40 to 160 acres. The native vegetation is mainly grass. Elevation is 5,800 to 6,500 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 53 to 58 degrees F, and the average frost-free period is 140 to 180 days.

Typically, the surface layer is brown loam about 10 inches thick. The upper 32 inches of the underlying





Figure 12.—An area of Luzena-Rock outcrop association, very steep.

material is brown clay loam, and the the lower part to a depth of 60 inches or more is pale brown silty clay loam interbedded with thin strata of gravelly material. In some small areas the surface layer is silt loam or clay loam. These areas are in the lower positions on the landscape.

Included in this unit are small areas of coarse textured gravelly soils, Rock outcrop, and arroyos. Included areas make up about 15 percent of the total acreage.

Permeability of the Manzano soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during June through September. The soil commonly is gullied.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on the Manzano soil is characterized by blue grama, sideoats grama,

tobosa, bottlebrush squirreltail, and black grama. The average annual production of air-dry vegetation ranges from 1,000 pounds per acre in favorable years to 425 pounds in unfavorable years. As the plant community deteriorates, sideoats grama and bottlebrush squirreltail decrease, and there is an increase in tobosa, ring muhly, and blue grama. Shrubs, cacti, and annual forbs also increase. Mesquite and juniper invade in some areas.

The potential natural plant community on the included Manzano silt loam and clay loam is characterized by blue grama, vine-mesquite, western wheatgrass, and tobosa. Fourwing saltbush generally is distributed evenly throughout the stand, but in some places it is present in smaller amounts. Bottlebrush squirreltail is also present in the potential plant community. The increase of this plant following range deterioration usually is a sign of early recovery. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 450 pounds in unfavorable years. If



the plant community deteriorates, western wheatgrass and vine-mesquite decrease, and there is an increase in blue grama, mat muhly, broom snakeweed, and annual forbs.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, brush management, rangeland seeding, and planned grazing systems.

**55—Marconi silty clay loam, 0 to 3 percent slopes.**

This deep, well drained soil is on flood plains, in swales, and on basin floors. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are elongated and are 100 to 480 acres. The native vegetation is mainly grass. Elevation is 4,100 to 4,700 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is reddish brown silty clay loam about 4 inches thick. The subsoil is reddish brown clay about 37 inches thick. The substratum to a depth of 60 inches or more is reddish brown clay loam that has a few fine crystals of gypsum in the lower part. In some of the less sloping areas the surface layer is silty clay.

Included in this unit are small areas of Dona Ana and Tres Hermanos soils that are generally in the higher lying areas, deep clayey soils that have high potential for expanding and cracking and are in the lowest positions, and deep soils that have a silty clay loam subsoil and are scattered throughout the unit. Also included are areas of soils on narrow gravelly ridges, in arroyos, and in gullies. Included areas make up about 15 percent of the total acreage.

Permeability of this Marconi soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is subject to frequent, very brief periods of flooding during June through September in 3 years out of 5. Salinity is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by tobosa, vine-mesquite, alkali sacaton, and scattered woody plants. Less desirable grasses such as burrograss and a variety of forbs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 600 pounds in unfavorable years. Deterioration of the potential plant community on this unit results in gullying. It is characterized by a substantial decrease in plant production. Burrograss, broom snakeweed, and forbs replace the dominant plants in the potential plant

community under these conditions. Mesquite and American tarbush invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**56—Mimbres silt loam, gently sloping.** This deep, well drained soil is on alluvial fans and flood plains associated with arroyos. It formed in mixed alluvium. Slope is 0 to 5 percent. Areas are elongated and are 100 to 480 acres. The native vegetation is mainly grass. Elevation is 4,050 to 5,800 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown silt loam about 7 inches thick. The subsoil is pinkish gray silty clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is brown and pink silt loam that commonly has thin strata of gravelly loam throughout. In some small areas the surface layer is loam or silty clay loam.

Included in this unit are small areas of gravelly soils on ridges and deep soils that have a sandy or clayey subsoil and are in positions similar to those of the Mimbres soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Mimbres soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 2 years out of 5.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by tobosa, vine-mesquite, and alkali sacaton. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 600 pounds in unfavorable years.

Deterioration of the potential plant community on this unit results in gullying. It is characterized by a substantial decrease in plant production. Burrograss, threeawn, and shrubs replace the dominant plants in the potential plant community under these conditions. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water development, fencing, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical



brush control because of the low rainfall and the hazards of water erosion and soil blowing.

**57—Mimbres silt loam.** This deep, well drained soil is on terraces, alluvial fans, and benches of old flood plains. It formed in mixed alluvium. Slope is 0 to 2 percent. Areas are irregular in shape and are 20 to 160 acres in size. Elevation is 4,150 to 4,350 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown silt loam about 4 inches thick. The subsoil is brown silt loam about 36 inches thick. The substratum to a depth of 60 inches or more is pale brown and pink, stratified material that has an average texture of silt loam. In some small areas the surface layer is silty clay loam, clay loam, sandy loam, or gravelly sandy loam.

Included in this unit are small areas of Adelino soils that are in positions similar to those of the Mimbres soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Mimbres soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during June through September.

This unit is used for irrigated crops and wildlife habitat.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the moderately slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage crops. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**58—Mimbres clay loam.** This deep, well drained soil is on terraces, alluvial fans, and benches of old flood plains. It formed in mixed alluvium. Slope is 0 to 1 percent. Areas are irregular in shape and are 5 to 30 acres in size. Elevation is 4,150 to 4,350 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown clay loam about 5 inches thick. The subsoil is brown silty clay loam about 22 inches thick. The substratum to a depth of 60 inches or more is brown and light brown, stratified silty clay

loam and clay loam. In some small areas the surface layer is silt loam or silty clay loam.

Included in this unit are small areas of Adelino soils that are in positions similar to those of the Mimbres soil and on arroyo bottoms. Included areas make up about 10 percent of the total acreage.

Permeability of this Mimbres soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is subject to rare periods of flooding during June through September.

This unit is used for irrigated crops.

This unit is suited to all climatically adapted crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper fertilization helps to maintain or increase yields. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the moderately slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage crops. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

**59—Minlith-Rock outcrop association, moderately rolling.** This map unit is on basalt lava flows. Slope is 1 to 15 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grass. Elevation is 4,500 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 55 percent Minlith gravelly loamy fine sand, 1 to 15 percent slopes, and 25 percent Rock outcrop, 1 to 15 percent slopes. The Minlith soil is on small ridges, on side slopes, and in nearly level areas, and Rock outcrop is on steep side slopes, narrow ridges, and protruding peaks.

Included in this unit are small areas of deep and moderately deep clay loam and clay in small pockets and depressional areas and shallow soils that have a gravelly loamy fine sand or sandy loam and sandy clay loam subsoil and are in low pockets. Included areas make up about 20 percent of the total acreage.

The Minlith soil is shallow and well drained. It formed in eolian and residual material derived from mixed sources. Typically, the surface layer is reddish brown gravelly loamy fine sand about 2 inches thick. The subsoil is reddish brown very gravelly loamy fine sand about 6 inches thick. Fractured basalt is at a depth of 8 inches.



Permeability of the Minlith soil is rapid. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

Rock outcrop consists of areas of exposed, highly fractured basalt lava flows and areas that have less than 4 inches of soil material over basalt.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on the Minlith soil is characterized by black grama. Dropseed, threeawn, and winterfat are also present. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 325 pounds in unfavorable years. As the plant community deteriorates, black grama decreases, and there is an increase in threeawn, fluffgrass, broom snakeweed, and annual forbs. Woody plants such as creosotebush and mesquite invade in some areas.

The Minlith soil is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. The soil has limited suitability for practices such as mechanical brush control and rangeland seeding because of the hazard of soil blowing and low rainfall. Practices that facilitate rangeland management such as installing pipelines for providing water for livestock and fencing are difficult to apply on this soil because of the shallow depth to basalt and the areas of Rock outcrop.

**60—Muzzler very gravelly loam, hilly.** This shallow, well drained soil is on dissected piedmonts. It formed in mixed alluvium. Slope is 5 to 35 percent. Areas are irregular in shape and are 240 to 1,000 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 5,150 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

Typically, the surface layer is brown very gravelly loam about 2 inches thick. The subsoil is brown very gravelly clay loam, gravelly clay, and very gravelly clay about 11 inches thick over cemented conglomerate. Depth to conglomerate ranges from 8 to 20 inches. Some small areas on the sides of drainageways and on narrow ridgetops have a cobbly loam surface layer.

Included in this unit are small areas of Rock outcrop that are along very steep side slopes and drainageways; moderately deep or deep soils, in low pockets and less sloping areas, that have a very gravelly loam surface layer and generally have a clay loam subsoil over cemented conglomerate; arroyos; acid igneous rock outcroppings; and deep clay loam and sandy loam on narrow arroyo flood plains, in swales, and in drainageways. Included areas make up about 40 percent of the total acreage.

Permeability of this Muzzler soil is slow. Available water capacity is very low. Effective rooting depth is 7 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, sideoats grama, New Mexico feathergrass, blue grama, and tobosa. Scattered shrubs and halfshrubs are in some areas, but the overall appearance of the plant community is largely that of open grassland. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 550 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, and New Mexico feathergrass decrease, and there is an increase in tobosa, threeawn, halfshrubs, and annual forbs.

This unit is suited to such rangeland management practices as proper grazing use and planned grazing systems. Fences and pipelines for providing water for livestock are difficult to install on the unit because of the shallow depth to the cemented conglomerate and the content of gravel in the profile. The unit has limited suitability for mechanical brush control and rangeland seeding because of the depth to the cemented conglomerate, steepness of slope, and gravel.

**61—Muzzler-Rock outcrop association, extremely steep.** This map unit is on dissected piedmonts. Slope is 25 to 95 percent. Areas are irregular in shape and are 200 to 800 acres in size. The native vegetation is mainly grass. Elevation is 5,200 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 40 percent Muzzler very gravelly sandy clay loam, 25 to 55 percent slopes, and 35 percent Rock outcrop, 45 to 95 percent slopes. The Muzzler soil is in the less sloping areas, and the Rock outcrop is in steeper areas along arroyos and hill peaks.

Included in this unit are small areas of moderately deep soils over conglomerate in pockets where side slopes are nearly level to sloping, Goldust soils on side slopes and toe slopes, Ustorthents at the base of extremely steep ledges and hillsides, and deep gravelly clay loam in drainageways. Included areas make up about 25 percent of the total acreage.

The Muzzler soil is shallow and well drained. It formed in mixed alluvium. About 60 percent of the surface is covered with stones, cobbles, and gravel. Typically, the surface layer is brown very gravelly sandy clay loam about 6 inches thick. The upper 4 inches of the subsoil is brown very cobbly clay loam, and the lower 7 inches is dark brown very cobbly clay that is about 5 percent



stones throughout. Extremely hard, cemented conglomerate is at a depth of 17 inches.

Permeability of the Muzzler soil is slow. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

Rock outcrop consists of areas of exposed extremely hard, cemented conglomerate derived from mixed igneous rock. These areas are steep to extremely steep and commonly are nearly vertical cliffs and ledges.

Areas of this unit that are accessible are used for livestock grazing. The unit is also used as watershed and for wildlife habitat.

The potential natural plant community on the Muzzler soil is characterized by black grama, sideoats grama, blue grama, and shrubs such as oak and sacahuista. Low-growing halfshrubs and forbs are distributed evenly throughout the stand in places but are present in smaller amounts than those plants characterizing the potential plant community. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 375 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, and blue grama decrease, and there is an increase in threeawn, dropseed, shrubs, and annual forbs. Mesquite invades in some areas.

The Muzzler soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. Fences and pipelines for providing water for livestock are difficult to install on this soil because of the shallow depth to rock, rock fragments in the profile, and steepness of slope.

**62—Nickel very gravelly fine sandy loam, very steep.** This deep, well drained soil is on truncated piedmonts (fig. 13). It formed in gravelly mixed alluvium. Slope is 10 to 65 percent. Areas are irregular in shape and are 100 to 1,000 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is brown very gravelly fine sandy loam about 3 inches thick. The upper 9 inches of the underlying material is brown very gravelly fine sandy loam, and the lower part to a depth of 60 inches or more is pink and light brown very gravelly sandy loam that is weakly cemented in the upper part. In some small areas the surface layer is very gravelly sandy loam.

Included in this unit are small areas of Chamberino and Eba soils on the less sloping ridges, arroyos, and Badland. Included areas make up about 20 percent of the total acreage.

Permeability of this Nickel soil is moderately slow. Penetration of moisture and roots is restricted by the weakly cemented layer. Available water capacity is low.

Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, wildlife habitat, and urban development.

The potential natural plant community on this unit is characterized by bush muhly, black grama, range ratany, mariola, creosotebush, and American tarbush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, mariola, broom snakeweed, and annual forbs. American tarbush also increases in some areas. Eventually, creosotebush dominates the plant community.

This unit is suited to such rangeland management practices as proper grazing use, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding, mechanical brush control, and stock ponds because of low rainfall, the hazard of water erosion, and steepness of slope. Practices that facilitate rangeland management such as installing pipelines and applying mechanical treatment are difficult to perform on this unit because of gravel and steepness of slope.

In the steeper areas of this unit, accessibility by livestock and proper distribution of grazing are major concerns.

This unit is poorly suited to urban development. The main limitations are the content of coarse fragments, high lime content, and slope. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If the density of housing is moderate, community sewage systems are needed.

**63—Nickel-Chamberino association, gently sloping.** This map unit is on piedmonts. Slope is 1 to 7 percent. Areas are irregular in shape and are 160 to 800 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Nickel very gravelly fine sandy loam, 1 to 7 percent slopes, and 35 percent Chamberino gravelly loam, 1 to 5 percent slopes.

Included in this unit are small areas of Tres Hermanos soils in the less sloping areas at higher elevations, Cave and Delnorte soils intermingled throughout the unit, arroyos, and deep clayey soils in narrow drainageways. Included areas make up about 20 percent of the total acreage.

The Nickel soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is light brown very gravelly fine sandy loam about 4 inches thick. The upper 8 inches of the underlying material is





Figure 13.—An area of Nickel very gravelly fine sandy loam, very steep.

light brown very gravelly fine sandy loam, the next 12 inches is pink very gravelly fine sandy loam that is weakly cemented with caliche, and the lower part to a depth of 60 inches or more is light brown extremely gravelly sandy loam.

Permeability of the Nickel soil is moderately slow. Penetration of moisture and roots is restricted by the weakly cemented layer. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Chamberino soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is pale brown and light yellowish brown gravelly loam about 4 inches thick. The subsoil is light brown gravelly loam about 12 inches thick. The upper 13 inches of the substratum is pink very gravelly loam that is weakly cemented with caliche, and the lower part to a

depth of 60 inches or more is light brown very gravelly sandy loam.

Permeability of the Chamberino soil is moderately slow. Penetration of moisture and roots is somewhat restricted by the weakly cemented layer. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by bush muhly, black grama, creosotebush, mariola, and American tarbush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, broom



snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of water erosion. Practices that facilitate rangeland management such as installing pipelines are difficult to apply on the Nickel soil because of the gravelly texture of the soil.

**64—Nickel-Tencee-Delnorte complex, moderately sloping.** This map unit is on piedmonts. Slope is 1 to 15 percent. Areas are irregular in shape and are 240 to 800 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 40 percent Nickel very gravelly fine sandy loam, 1 to 15 percent slopes, 20 percent Tencee very gravelly loam, 1 to 15 percent slopes, and 20 percent Delnorte very gravelly fine sandy loam, 1 to 15 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Chamberino, Dona Ana, and Tres Hermanos soils in the less sloping areas, deep soils in narrow drainageways, arroyos, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

The Nickel soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is pale brown very gravelly fine sandy loam about 2 inches thick. The upper 11 inches of the underlying material is yellowish brown very gravelly fine sandy loam, the next 9 inches is white very gravelly sandy loam that is weakly cemented with caliche, and the lower part to a depth of 60 inches or more is very pale brown very gravelly fine sandy loam.

Permeability of the Nickel soil is moderately slow. Penetration of moisture and roots is somewhat restricted by the weakly cemented layer. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Tencee soil is shallow and well drained. It formed in gravelly mixed alluvium that is strongly influenced by limestone. Typically, the surface layer is pale brown very gravelly loam about 3 inches thick. The underlying material is pale brown very gravelly loam 9 inches thick. White, extremely hard, laminated and cemented caliche and gravel are at a depth of 12 inches.

Permeability of the Tencee soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water

erosion is moderate. The hazard of soil blowing is moderate.

The Delnorte soil is shallow and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is pale brown very gravelly fine sandy loam about 2 inches thick. The upper 10 inches of the underlying material is yellowish brown very gravelly loam. White, extremely hard, laminated and cemented caliche and gravel are at a depth of 12 inches.

Permeability of the Delnorte soil is moderate. Available water capacity is very low. Effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, wildlife habitat, and urban development.

The potential natural plant community on this unit is characterized by bush muhly, black grama, creosotebush, mariola, and tarbush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, mariola, broom snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding, mechanical brush control, and stock water ponds because of the low rainfall, the hazard of water erosion, and shallow or gravelly soils. Pipelines for providing water for livestock and fences are difficult to install on the Delnorte and Tencee soils because of the shallow depth to the cemented gravel and caliche. Pipelines may be difficult to install on the Nickel soil because of the gravelly texture of the soil.

This unit is poorly suited to urban development. The main limitations are the content of coarse fragments, high lime content, the depth to the cemented gravel and caliche, and slope in some areas. Lawns and small shrubs can be grown satisfactorily if the surface is covered with 8 to 10 inches of topsoil and the soil is irrigated.

**65—Pajarito loamy sand, 1 to 5 percent slopes.**

This deep, well drained soil is on terraces and benches of old flood plains. It formed in mixed alluvium. Areas are irregular in shape and are 200 to 400 acres in size. Elevation is 4,400 to 4,600 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown loamy sand about 5 inches thick. The subsoil is light brown sandy loam about 13 inches thick. The substratum to a depth



of 60 inches or more is very pale brown and light yellowish brown sandy loam.

Included in this unit are small areas of soils that are noncalcareous in the upper part of the profile, soils that have a layer of lime accumulation, soils that have weakly cemented sandstone above a depth of 40 inches, and soils that are gravelly throughout. Also included are small areas of Bluepoint and Yturbide soils on the steeper side slopes. Included areas make up about 20 percent of the total acreage.

Permeability of this Pajarito soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for urban development.

This unit is suited to urban development. The main limitation is the gravelly and sandy texture of the soil and the hazard of soil blowing. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

**66—Pajarito fine sandy loam.** This deep, well drained soil is on terraces and benches of old flood plains. It formed in mixed alluvium. Slope is 0 to 3 percent. Where irrigated, the unit is generally bench leveled. Areas are irregular in shape and are 20 to 160 acres in size. Elevation is 4,150 to 4,350 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown fine sandy loam about 7 inches thick. The subsoil is light brown fine sandy loam about 13 inches thick. The substratum to a depth of 60 inches or more is light brown and pink, stratified fine sandy loam, sandy loam, loam, and loamy sand. In some small areas the surface layer is sandy clay loam, gravelly sandy loam, or gravelly loam.

Included in this unit are small areas of Adelino soils that are in positions similar to those of the Pajarito soil, Arizo soils, and soils that have a gravelly subsoil and are along arroyos and arroyo fans. Included areas make up about 20 percent of the total acreage.

Permeability of this Pajarito soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for irrigated crops, urban development, and wildlife habitat.

This unit is suited to all climatically adapted plants. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Soil blowing can be controlled by keeping the soil rough and cloddy when it is not protected by vegetation. Proper fertilization helps to maintain or increase yields.

Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate.

Surface, sprinkler, and drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Good management of irrigation water improves yields, reduces leaching of plant nutrients, and helps to prevent the accumulation of harmful salts.

This unit is well suited to urban development. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

**67—Pinaleno-Nolam association, moderately sloping.** This map unit is on piedmonts, high valley terraces, and alluvial fans. Slope is 1 to 15 percent. Areas are irregular in shape and are 100 to 400 acres in size. The native vegetation is mainly grass. Elevation is 4,300 to 5,700 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Pinaleno very gravelly sandy loam, 3 to 15 percent slopes, and 35 percent Nolam very gravelly loam, 1 to 7 percent slopes. The Pinaleno soil is on ridges, side slopes, and lower lying terraces, and the Nolam soil is on the less sloping terraces at the higher elevations.

Included in this unit are small areas of soils that have less gravel throughout the profile and are in positions similar to those of the Pinaleno and Nolam soils, Nickel and Tres Hermanos soils on the higher mesas and ridges, and deep, nongravelly soils in narrow drainageways. Included areas make up about 20 percent of the total acreage.

The Pinaleno soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is reddish brown very gravelly sandy loam about 3 inches thick. The subsoil is reddish brown very gravelly sandy loam and yellowish red very gravelly sandy clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is reddish yellow very gravelly sandy loam.

Permeability of the Pinaleno soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Nolam soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is reddish brown very gravelly loam about 2 inches thick. The subsoil is reddish brown and light reddish brown very gravelly sandy clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is pink very gravelly sandy loam that is weakly cemented with caliche in the upper part.



Permeability of the Nalam soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, bush muhly, cane bluestem, sideoats grama, blue grama, yucca, sotol, and ocotillo. The average annual production of air-dry vegetation ranges from 675 pounds per acre in favorable years to 275 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, cane bluestem, sideoats grama, and blue grama decrease, and there is an increase in fluffgrass, threeawn, tobosa, broom snakeweed, creosotebush, and annual forbs.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of water erosion.

#### **68—Reakor-Dona Ana association, gently sloping.**

This map unit is on piedmonts. Slope is 1 to 5 percent. Areas are irregular in shape and are 160 to 800 acres in size. The native vegetation is mainly grass. Elevation is 4,100 to 5,300 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 50 percent Reakor silt loam, 1 to 5 percent slopes, and 30 percent Dona Ana fine sandy loam, 1 to 5 percent slopes. The Reakor soil is in the lower positions on the landscape.

Included in this unit are small areas of soils that have a clay loam subsoil; Berino, Tres Hermanos, and Wink soils that are generally in the highest positions on the landscape, and Marconi soils that have slopes of 0 to 1 percent and are in the lowest positions on the landscape. Included areas make up about 20 percent of the total acreage.

The Reakor soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown silt loam about 3 inches thick. The subsoil is light brown silty clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is pink and light brown silty clay loam.

Permeability of the Reakor soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Dona Ana soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown fine sandy loam about 3 inches thick. The subsoil is reddish yellow sandy clay loam about 18 inches thick.

The substratum to a depth of 60 inches or more is sandy clay loam. It is pink in the upper part and reddish yellow in the lower part.

Permeability of the Dona Ana soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, bush muhly, tobosa, burrograss, dropseed, threeawn, and alkali sacaton. Scattered soap tree yucca and longleaf ephedra are in some areas. The average annual production of air-dry vegetation ranges from 675 pounds per acre in favorable years to 300 pounds in unfavorable years. As the plant community deteriorates, black grama and bush muhly decrease, and there is an increase in threeawn, burrograss, tobosa, and annual forbs. Woody plants such as mesquite invade in some areas. Eventually, burrograss dominates the plant community on the Reakor soil.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of soil blowing and water erosion.

**69—Redbank-Torrifluvents association, gently sloping.** This map unit is on alluvial flood plains. Slope is 0 to 9 percent. Areas are elongated and are 60 to 200 acres. The native vegetation is mainly grass and shrubs. Elevation is 5,800 to 6,500 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 50 percent Redbank loam, 0 to 5 percent slopes, and 30 percent Torrifluvents, 0 to 9 percent slopes. In areas of this unit in the Lake Valley area, the Torrifluvents are nearly absent and the Redbank soil makes up about 80 percent of the unit. The Redbank soil is on stable terraces, and the Torrifluvents are along and in watercourses.

Included in this unit are small areas of soils that have sandy loam or loamy sand underlying material and are in positions similar to those of the Redbank soil. Also included are arroyos. Included areas make up about 20 percent of the total acreage.

The Redbank soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown loam about 10 inches thick. The underlying material to a depth of 60 inches or more is brown very fine sandy loam and loam. In some small areas the surface layer is fine sandy loam or clay loam.



Permeability of the Redbank soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to rare periods of flooding during June through September.

The Torrifluvents are deep and well drained to excessively drained. They formed in mixed alluvium. A sample profile has a pinkish gray very gravelly loamy sand surface layer overlying light brown, highly stratified material that has an average texture of very gravelly loamy sand and extends to a depth of 60 inches or more.

Permeability of the Torrifluvents is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow to rapid, and the hazard of water erosion, mostly from floodwater, is severe. The hazard of soil blowing is high. This soil is subject to frequent, brief periods of flooding during June through September in 3 years out of 5.

Most areas of this unit are used for livestock grazing and wildlife habitat. A few areas are used for small irrigated pastures and crops for livestock feed.

The potential natural plant community on the Redbank soil is characterized by giant sacaton and small amounts of alkali sacaton and vine-mesquite (fig. 14). Cane bluestem and sideoats grama are in some areas. The average annual production of air-dry vegetation ranges from 4,000 pounds per acre in favorable years to 1,750 pounds in unfavorable years. Deterioration of the potential plant community results in gullying. Such deterioration is characterized by a substantial decrease in plant production. Plants such as tobosa and various shrubs replace the dominant plants in the potential plant community under these conditions. Mesquite invades in some areas.

The Torrifluvents support a variable plant community that is characterized by arrowweed pluchea, knifeleaf condalia, and, in some areas, mesquite. These soils provide only marginal forage for livestock grazing.

The Redbank soil is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, brush management, and planned grazing systems.

**70—Rock outcrop, extremely steep.** This map unit is on hills and low mountains. It consists of areas of exposed limestone that are in the form of peaks, dikes, ridges, and nearly vertical cliffs and areas that have less than 4 inches of soil material over limestone. Slope is 75 to 150 percent. Areas are elongated and are 200 to 640 acres. The native vegetation is mainly very sparse grasses and shrubs. Elevation is 5,300 to 7,500 feet. The average annual precipitation is 8 to 13 inches, the average annual air temperature is 56 to 62 degrees F, and the average frost-free period is 170 to 210 days.

Included in this unit are small areas of Lozier soils in very small pockets between ledges and saddles, moderately deep and deep, very stony soils on colluvial side slopes, and igneous rock, shale, and sandstone outcroppings. Included areas make up about 20 percent of the total acreage.

This unit is used for wildlife habitat, watershed, recreation, and esthetic value.

**71—Rock outcrop-Courthouse complex, extremely steep.** This map unit is on hills. Slope is 15 to 75 percent. Areas are irregular in shape and are 160 to 1,000 acres in size. The native vegetation is mainly grass and shrubs. Elevation is 4,400 to 6,000 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 210 days.

This unit is 40 percent Rock outcrop, 15 to 75 percent slopes, and 25 percent Courthouse flaggy loam, 15 to 55 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Elbutte soils that are shallow over shale and are between ledges of sandstone outcroppings, moderately deep and deep stony soils on colluvial side slopes, deep clay loam in swales and on narrow flood plains, arroyos, and limestone, and igneous rock outcroppings. Included areas make up about 35 percent of the total acreage.

Rock outcrop consists of areas of exposed sandstone and shale and areas that have less than 4 inches of soil material over sandstone or shale. The shale erodes easily, leaving ledges of exposed sandstone in layers on hill crests and side slopes. The shale also absorbs some moisture to support limited plant growth.

The Courthouse soil is shallow and well drained. It formed in material weathered from sandstone. Typically, the surface layer is pale brown flaggy loam about 2 inches thick. The upper 3 inches of the underlying material is brown gravelly sandy clay loam, and the lower part to a depth of 8 inches is reddish brown flaggy sandy clay loam. Sandstone is at a depth of 8 inches.

Permeability of the Courthouse soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, watershed, wildlife habitat, and urban development. Slope in some areas limits accessibility to grazing.

The potential natural plant community on the Courthouse soil is characterized by black grama, bush muhly, cane bluestem, green sprangletop, little leaf sumac, yucca, ocotillo, and cacti. Scattered oak and juniper are in some areas. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 325 pounds in unfavorable





Figure 14.—Giant sacaton in area of Redbank loam in foreground. Ildefonso-Scholle association, hilly, is in background.

years. As the plant community deteriorates, black grama, bush muhly, cane bluestem, and green sprangletop decrease, and there is an increase in threeawn, slim tridens, broom snakeweed, annual forbs, and shrubs. Mesquite invades in some areas.

The Courthouse soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. The soil is not suited to most mechanical range improvement practices because of the shallow depth to sandstone, stoniness, and the hazard of water erosion. Practices that facilitate rangeland management such as pipelines for providing water for livestock and fences are difficult to apply on this soil

because of the shallow depth to sandstone, stoniness, and steepness of slope. Steepness of slope also limits accessibility by livestock in some areas.

This unit is poorly suited to urban development. The main limitations are slope, depth to bedrock, and areas of Rock outcrop.

**72—Rock outcrop-Deama association, extremely steep.** This map unit is on foothills and low mountains. Slope is 30 to 95 percent. Areas are irregular in shape and are 160 to 800 acres in size. The native vegetation is mainly grass, shrubs, and some pinyon and juniper trees at the higher elevations. Elevation is 5,100 to 7,800



feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 40 percent Rock outcrop, 30 to 95 percent slopes, and 30 percent Deama very stony loam, 5 to 55 percent slopes. Rock outcrop consists of limestone ledges, ridges, hill and mountain peaks, and extremely steep side slopes. The Deama soil is in saddles and on mesa tops, in swales and the less sloping areas above ledges, and on moderately steep side slopes. This unit generally is less sloping at the lower elevations.

Included in this unit are small areas of moderately deep stony loam on side slopes; extremely stony and bouldery soils on talus slopes; deep soils on narrow canyon bottoms; outcroppings of shale, sandstone, and igneous rock; and arroyos. Also included at the higher elevations on north-facing side slopes along the western boundary of the survey area are soils that are darker in color. These areas make up about 5 percent of the unit. Included areas make up about 30 percent of the total acreage.

Rock outcrop consists of areas of exposed limestone and areas that have less than 4 inches of soil material over bedrock.

The Deama soil is shallow and well drained. It formed in material weathered from limestone. Typically, the surface layer is dark grayish brown very stony loam about 4 inches thick. The upper 6 inches of the underlying material is brown very stony loam, and the lower 3 inches is pale brown very stony loam. Caliche-coated limestone is at a depth of 13 inches.

Permeability of the Deama soil is moderate. Available water capacity is very low. Effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Areas of this unit that are accessible are used for livestock grazing. The unit is also used as watershed, for wildlife habitat, and for esthetic value.

The potential natural plant community on the Deama soil is characterized by New Mexico feathergrass, black grama (mostly on south-facing side slopes and at elevations below 6,500 feet), sideoats grama, species of muhly, and mountainmahogany. Scattered juniper and oak are in some areas. Winterfat, broom snakeweed, and forbs may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The estimated annual production of air-dry vegetation ranges from 850 pounds per acre in favorable years to 350 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, and winterfat decrease, and there is an increase in blue grama, threeawn, oak, and juniper.

In some areas of the Deama soil at higher elevations and on north- and east-facing side slopes, pinyon and juniper are naturally dominant. The pinyon and juniper canopy exceeds 25 percent. Scattered ponderosa pine is

present in some places. Among the understory shrubs are skunkbush sumac, sacahuista, and oak. Grasses include blue grama, sideoats grama, New Mexico feathergrass, pinyon ricegrass, bullgrass, and species of muhly.

The Deama soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. It is not suited to such management practices as rangeland seeding and mechanical brush control because of the steepness of slope, stones, and depth to limestone. Practices that facilitate rangeland management such as fencing and installing pipelines for providing water for livestock are difficult to apply on this soil because of the steepness of slope, stones, and depth to limestone.

The soil in this unit has limited suitability for pinyon and juniper production. It supports a stand of trees with a basal area of about 55 square feet per acre. The potential is moderate for the production of firewood and moderately low to moderate for the production of Christmas trees, pinyon nuts, posts, and stays. For optimum production of all resources, management should be for a combination of uses, including wood production.

**73—Rock outcrop-Luzena association, extremely steep.** This map unit is on foothills and low mountains. Slope is 30 to 95 percent. Areas are irregular in shape and are 160 to 960 acres in size. The native vegetation is mainly grass, shrubs, and scattered juniper. Elevation is 5,300 to 7,800 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 45 percent Rock outcrop, 30 to 95 percent slopes, and 30 percent Luzena gravelly clay loam, 30 to 75 percent slopes. Rock outcrop consists of hill or mountain peaks, narrow ridges, cliffs, and scarps, and the Luzena soil is in small saddles, between ledges, and on the less sloping side slopes.

Included in this unit are small areas of soils in the southwestern part of the survey area that are darker in color. Also included are soils that are very gravelly and moderately deep over bedrock; soils that have less clay in the subsoil; deep, stony colluvial soils on toe slopes, below scarps, on canyon bottoms, and in arroyos; and small areas of volcanic tuff, basalt, limestone, and sandstone outcroppings. Included areas make up about 25 percent of the total acreage.

Rock outcrop consists of areas of exposed acid igneous rock that is dominantly rhyolite and andesite; however, in the southwestern corner of the survey area, it is dominantly tuff. Rock outcrop also consists of areas that have less than 4 inches of soil material over bedrock.

The Luzena soil is shallow and well drained. It formed in material derived dominantly from acid igneous rock.



About 30 percent of the surface is covered with stones, cobbles, and gravel. Typically, the surface layer is dark brown gravelly clay loam about 8 inches thick. The subsoil is brown gravelly clay about 10 inches thick. Acid igneous bedrock is at a depth of 18 inches.

Permeability of the Luzena soil is slow. Available water capacity is very low. Effective rooting depth is 7 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Areas of this unit that are accessible are used for livestock grazing. The unit is also used as watershed, for wildlife habitat, and for esthetic value.

The potential natural plant community on the Luzena soil is characterized by sideoats grama, blue grama, little bluestem, cane bluestem, Arizona cottontop, plains lovegrass, and species of muhly. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 575 pounds in unfavorable years. As the plant community deteriorates, sideoats grama, little bluestem, and cane bluestem decrease, and there is an increase in threeawn, blue grama, broom snakeweed, and shrubs, including juniper.

The Luzena soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. The soil is not suited to such practices as mechanical brush control and rangeland seeding because of the shallow depth to bedrock, steepness of slope, and cobbles. Fences and pipelines for providing water for livestock are difficult to install on this soil because of stones and cobbles, steepness of slope, and depth to bedrock.

**74—Rock outcrop-Rizozo association, extremely steep.** This map unit is on hills and low mountains. Slope is 15 to 95 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grass, shrubs, and scattered juniper and pinyon. Elevation is 5,600 to 7,500 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 35 percent Rock outcrop, 15 to 95 percent slopes, and 30 percent Rizozo stony loam, 15 to 55 percent slopes. Rock outcrop consists of ledges, ridges, hill and mountain peaks, and extremely steep side slopes. The Rizozo soils are in saddles, on tops of mesas and ledges, and on the less sloping side slopes.

Included in this unit are small areas of soils that are more than 35 percent coarse fragments throughout or are noncalcareous and soils that have a clayey subsoil. Also included are small areas of shale, limestone, and igneous rock outcroppings, moderately deep stony soils along toe slopes, and deep clay loam associated with arroyos. Included areas make up about 35 percent of the total acreage.

Rock outcrop consists of areas of exposed sandstone and areas that have less than 4 inches of soil material over bedrock.

The Rizozo soil is shallow and well drained. It formed in material derived dominantly from sandstone with some influence from shale. Typically, the surface layer is reddish brown stony loam about 6 inches thick. The underlying material is reddish brown gravelly loam about 4 inches thick. Sandstone is at a depth of 10 inches.

Permeability of the Rizozo soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, watershed, wildlife habitat, and esthetic value.

The potential natural plant community on the Rizozo soil is characterized by sideoats grama, little bluestem, cane bluestem, blue grama, and species of muhly. Pinyon and juniper are typically on north- and east-facing side slopes, and a variety of shrubs, cool-season grasses, and forbs are scattered throughout the unit. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 300 pounds in unfavorable years. As the plant community deteriorates, cool-season grasses, sideoats grama, little bluestem, and cane bluestem decrease, and there is an increase in blue grama, galleta, wolftail, hairy grama, threeawn, and woody plants.

In some areas of the Rizozo soil at higher elevations and on north- and east-facing side slopes, pinyon and juniper are naturally dominant. In these areas the pinyon and juniper canopy exceeds 25 percent. Scattered ponderosa pine is present in some places. Among the understory shrubs are oak and mountainmahogany. Among the grasses are blue grama, little bluestem, cane bluestem, brome, and pinyon ricegrass.

The Rizozo soil is suited to such rangeland management practices as proper grazing use and planned grazing systems. It is not suited to such practices as mechanical brush control and rangeland seeding because of stoniness and the depth to sandstone. Fences and pipelines for providing water for livestock are difficult to install on the Rizozo soil because of the depth to sandstone and stoniness.

This unit has limited suitability for juniper and pinyon production. It supports a stand of trees with a basal area of about 60 square feet per acre. The potential for firewood production is moderate, and the potential for Christmas tree, pinyon nut, post, and stay production is moderately low to moderate. For optimum production of all resources, management should be for a combination of uses, including wood production.

**75—Rock outcrop-Torriorthents association, extremely steep.** This map unit is on hills and mountainsides. Slope is 5 to 150 percent. Areas are irregular in shape and are 160 to 640 acres in size. The



native vegetation is mainly grass and shrubs. Elevation is 4,000 to 6,800 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 210 days.

This unit is 40 percent Rock outcrop, 25 to 150 percent slopes, and 35 percent Torriorthents, 5 to 75 percent slopes. Rock outcrop is in the steeper areas in the form of extrusions, escarpments, ledges, and extremely steep side slopes, and Torriorthents are in small saddles, on ledges, and on side slopes in the less sloping areas.

Included in this unit are small areas of deep and moderately deep, very stony to very bouldery colluvial soils on toe slopes, below rock ledges, and on steep side slopes; shale and sandstone outcroppings; Lozier and Luzena soils in the more gently sloping areas; and Nickel and Tencee soils rimming the base of hillsides. Also included are small areas of soils in narrow drainageways and arroyos. Included areas make up about 25 percent of the total acreage.

Rock outcrop consists of areas of exposed acid igneous and metamorphic rock and areas that have less than 4 inches of soil material over bedrock. The exposed rock has many small cracks that are filled with soil material.

Torriorthents are shallow to moderately deep and are well drained. They formed in mixed colluvium and alluvium. A sample profile has a cobbly loam surface layer overlying highly stratified gravelly loam, very cobbly loam, cobbly sandy loam, and very gravelly sandy loam.

Permeability of the Torriorthents is moderate to rapid. Available water capacity is very low to low. Effective rooting depth is 4 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Areas of this unit that are accessible are used for livestock grazing. The unit is also used as watershed, for wildlife habitat, and for esthetic value.

The potential natural plant community on the Torriorthents is characterized by black grama, bush muhly, sideoats grama, cane bluestem, and threeawn. At the higher elevations, juniper and oak are on north- and east-facing side slopes in some areas, and many kinds of shrubs, halfshrubs, and cacti are scattered throughout the stand. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 325 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, sideoats grama, and cane bluestem decrease, and there is an increase in fluffgrass, threeawn, tobosa, broom snakeweed, oak, and juniper. At the lower elevations, mesquite invades in some areas.

The Torriorthents are suited to such rangeland management practices as proper grazing use and planned grazing systems. They are not suited to most mechanical range improvement practices because of low

rainfall, shallow soil depth, and steepness of slope. Pipelines for providing water for livestock and fences may be difficult to install on the Torriorthents because of the shallow depth to bedrock, areas of Rock outcrop, and steepness of slope. Steepness of slope may also limit good distribution of livestock grazing.

**76—Scholle-Ildefonso association, moderately rolling.** This map unit is on piedmonts. Slope is 1 to 15 percent. Areas are irregular in shape and are 200 to 800 acres in size. The native vegetation is mainly grass. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 40 percent Scholle very gravelly loam, 1 to 15 percent slopes, and 30 percent Ildefonso gravelly loam, 1 to 15 percent slopes. The Scholle soil generally is in the more stable areas on the landscape, and the Ildefonso soil is on ridges and side slopes.

Included in this unit are small areas of soils that have a clayey subsoil or more than 35 percent rock fragments in the subsoil and are in positions similar to those of the Scholle soil. Also included are small areas of deep sandy loam or clay loam in narrow drainageways, Rock outcrop, and Badland. Included at higher elevations on north-facing side slopes along the western boundary of the survey area are soils that are darker in color. These areas make up about 5 percent of the unit. Included areas make up about 30 percent of the total acreage.

The Scholle soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown very gravelly loam about 5 inches thick. The subsoil is reddish brown and light reddish brown gravelly clay loam 28 inches thick. The substratum to a depth of 60 inches or more is light reddish brown gravelly clay loam.

Permeability of the Scholle soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Ildefonso soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown gravelly loam about 4 inches thick. The subsoil is brown gravelly loam about 10 inches thick. The substratum to a depth of 60 inches or more is light brown and pink very gravelly loam. In some small areas the surface layer is gravelly fine sandy loam.

Permeability of the Ildefonso soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, sideoats grama, New



Mexico feathergrass, Hall panicum, and scattered halfshrubs. The average annual production of air-dry vegetation ranges from 1,300 pounds per acre in favorable years to 550 pounds in unfavorable years. As the plant community deteriorates, black grama, New Mexico feathergrass, and sideoats grama decrease, and there is an increase in blue grama, threeawn, fluffgrass, broom snakeweed, ring muhly, and annual forbs. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the gravelly texture of the soils, steepness of slope in some areas, and the hazard of water erosion.

**77—Simona loamy fine sand, gently sloping.** This shallow, well drained soil is on piedmonts. It formed in mixed alluvium. Slope is 1 to 9 percent. Areas are irregular in shape and are 240 to 800 acres in size. The native vegetation is mainly grass. Elevation is 4,050 to 5,400 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown loamy fine sand about 4 inches thick. The subsoil is light brown gravelly fine sandy loam about 11 inches thick. The upper part of the substratum is laminated and indurated caliche, and the lower part to a depth of 60 inches or more is hard caliche nodules and gravel that are cemented with lime and can be broken with a shovel. In some slightly depressional areas and in some nearly level areas, the surface layer is fine sandy loam.

Included in this unit are small areas of Cave, Delnorte, and Tencee soils and soils that are 20 to 30 inches deep to indurated caliche. These soils are scattered throughout mapped areas. Included areas make up about 15 percent of the total acreage.

Permeability of this Simona soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, dropseed, threeawn, and winterfat. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 325 pounds in unfavorable years. As the plant community deteriorates, black grama decreases, and there is an increase in threeawn, fluffgrass, broom snakeweed, and annual forbs. Woody plants such as creosotebush and mesquite invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as mechanical brush control and rangeland seeding because of the low rainfall and the hazard of soil blowing (fig. 15). Pipelines for providing water for livestock and fences are difficult to install on the unit because of the shallow depth to hard caliche.

**78—Stellar-Continental association, gently sloping.** This map unit is on piedmonts. Slope is 1 to 9 percent. Areas are irregular in shape and are 80 to 1,000 acres in size. The native vegetation is mainly grass. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Stellar loam, 1 to 9 percent slopes, and 25 percent Continental fine sandy loam, 1 to 9 percent slopes. The Stellar soil commonly is in slightly depressional areas and swales.

Included in this unit are small areas of Stellar silty clay loam that are in drainageways and make up about 15 percent of the map unit. Also included are small areas of Berino and Dona Ana soils on the higher terraces and ridges, Tres Hermanos soils on gravelly ridges and side slopes, and Mimbres soils in drainageways. Included areas make up about 30 percent of the total acreage.

The Stellar soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown loam about 2 inches thick. The subsoil is reddish brown. The upper 18 inches is clay loam, and the lower 18 inches is clay. The substratum to a depth of 60 inches or more is pink and light reddish brown clay loam.

Permeability of the Stellar soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

The Continental soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is strong brown fine sandy loam about 2 inches thick. Below this is a buried surface layer of strong brown sandy clay loam about 2 inches thick. The upper 26 inches of the subsoil is strong brown clay and light brown clay loam, and the lower 17 inches is reddish yellow sandy clay loam. The substratum to a depth of 60 inches or more is pink sandy clay loam.

Permeability of the Continental soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by tobosa, black grama, burrograss and alkali sacaton. The average annual production of air-dry





Figure 15.—Soil blowing problem is evident in dunes around shrubs in an area of Simona loamy fine sand, gently sloping.

vegetation ranges from 600 pounds per acre in favorable years to 200 pounds in unfavorable years. As the plant community deteriorates, tobosa, black grama, and alkali sacaton decrease, and there is an increase in burrograss, shrubs, broom snakeweed, and annual forbs. Eventually, even some of these plants decrease, the density of the stand declines, and total production becomes very low. Mesquite and American tarbush invade in some areas.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.

**79—Thunderbird-Cabazon association, moderately rolling.** This map unit is on basalt lava flows. Slope is 1 to 15 percent. Areas are irregular in shape and are 80 to

480 acres in size. The native vegetation is mainly grass. Elevation is 5,200 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 50 to 58 degrees F, and the average frost-free period is 120 to 180 days.

This unit is 50 percent Thunderbird loam, 1 to 10 percent slopes, and 30 percent Cabazon gravelly clay loam, 1 to 15 percent slopes. The Thunderbird soil is in the less sloping and open areas, and the Cabazon soil is on ridges, on the border of lava flows, and on side slopes between lava flows.

Included in this unit are small areas of soils that have a clay loam subsoil and are more than 40 inches deep over basalt, soils that are more than 35 percent coarse fragments and are on ridges, basalt outcroppings, and Dona Ana soils in nearly level, slightly concave areas. Included areas make up about 20 percent of the total acreage.



The Thunderbird soil is moderately deep and well drained. It formed in residuum and eolian material derived dominantly from basalt. Typically, the surface layer is brown loam about 2 inches thick. About 5 percent of the surface is covered with gravel, cobbles, and stones. The upper 9 inches of the subsoil is dark brown clay loam, and the lower 8 inches is dark brown gravelly clay. The substratum is dark brown very gravelly clay loam about 7 inches thick over basalt. Basalt is at a depth of 26 inches.

Permeability of the Thunderbird soil is slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

The Cabezon soil is shallow and well drained. It formed in residuum and eolian material derived dominantly from basalt. About 10 percent of the surface is covered with cobbles and stones. Typically, the surface layer is brown gravelly clay loam about 4 inches thick. The subsoil is brown gravelly clay loam about 8 inches thick. Basalt that commonly is coated with caliche on the surface is at a depth of 12 inches.

Permeability of the Cabezon soil is slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by blue grama, sideoats grama, western wheatgrass and New Mexico feathergrass. Little bluestem, cane bluestem, tobosa, and curlymesquite may be distributed evenly throughout the stand but are present in smaller amounts than those plants characterizing the potential plant community. The estimated annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 425 pounds in unfavorable years. As the plant community deteriorates, sideoats grama, western wheatgrass, and New Mexico feathergrass decrease, and there is an increase in blue grama, tobosa, and curlymesquite. Eventually, even some of these plants decrease, the density of the stand declines, and total production becomes very low.

This unit is suited to such rangeland management practices as proper grazing use and planned grazing systems. The Cabezon soil in some areas has limited suitability for practices such as mechanical brush control because of the shallow soil depth. Pipelines for providing water for livestock and fences are difficult to install on the Cabezon soil because of the depth to bedrock.

**80—Torriorthents dissected-Rock outcrop association, very steep.** This map unit is on truncated piedmont slopes. Slope is 5 to 65 percent. Areas are irregular in shape and are 100 to 800 acres in size. The

native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,050 to 6,000 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 220 days.

This unit is 50 percent Torriorthents cobbly loam, 5 to 65 percent slopes, dissected, and 25 percent Rock outcrop. Torriorthents, dissected, are on side slopes of arroyos and between rock ledges. Rock outcrop occurs as igneous scarps, ridges, and ledges.

Included in this unit are small areas of sandstone and limestone outcrops; shaly, shallow soils that are underlain by bedrock and are between ledges of sandstone outcrops; Badland in extremely steep areas; Nickel and Chamberino soils in nearly level areas; and deep loam or clay loam in swales and drainageways. Included areas make up about 25 percent of the total acreage.

Torriorthents are shallow to deep and are well drained. They formed in mixed colluvium and alluvium. A sample profile has a brown cobbly loam surface layer overlying light brown very cobbly loam, highly stratified gravelly loam, cobbly sandy loam, and very gravelly sandy loam.

Permeability of the Torriorthents is moderate to moderately rapid. Available water capacity generally is low to moderate. Effective rooting depth is 4 to 60 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight to moderate.

Rock outcrop consists of areas of exposed igneous rock and tuff in the form of extremely steep scarps, ridges, and ledges.

This unit is used as watershed, for wildlife habitat, and for esthetic value. Some of the less sloping areas of Torriorthents can be used for livestock grazing.

The potential natural plant community on this unit is characterized by bush muhly, black grama, and creosotebush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly and black grama decrease, and there is an increase in creosotebush, fluffgrass, broom snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

The Torriorthents are suited to such rangeland management practices as proper grazing use, fencing, and planned grazing systems. They have limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall, the hazard of water erosion, and steepness of slope. Steepness of slope also limits accessibility by livestock in some areas.

**81—Tres Hermanos gravelly fine sandy loam, gently sloping.** This deep, well drained soil is on piedmonts. It formed in gravelly mixed alluvium. Slope is 1 to 9 percent. Areas are irregular in shape and are 200



to 800 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,100 to 5,900 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is light brown gravelly fine sandy loam about 2 inches thick over a brown gravelly loam subsurface layer 2 inches thick. The subsoil is brown gravelly sandy clay loam about 10 inches thick. The upper 6 inches of the substratum is pink gravelly loam that is weakly cemented, and the lower part to a depth of 60 inches or more is light brown extremely gravelly sandy loam. In some small areas the surface layer is very gravelly fine sandy loam.

Included in this unit are small areas of soils that are noncalcareous in the upper part and are in the less sloping areas. Also included are small areas of Nickel and Chamberino soils that are in positions similar to those of the Tres Hermanos soil and deep nongravelly soils in swales and arroyos. Included areas make up about 25 percent of the total acreage.

Permeability of this Tres Hermanos soil is moderately slow. Penetration of moisture and roots is somewhat restricted by the weakly cemented layer. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by bush muhly, black grama, cane bluestem, and creosotebush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly, black grama, and cane bluestem decrease, and there is an increase in creosotebush, fluffgrass, mariola, broom snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of water erosion and soil blowing.

**82—Tres Hermanos-Hap association, gently sloping.** This map unit is on piedmonts. Slope is 1 to 10 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grass, shrubs, and halfshrubs. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 45 percent Tres Hermanos gravelly loam, 1 to 10 percent slopes, and 40 percent Hap very gravelly

loam, 1 to 7 percent slopes. The Tres Hermanos soil is on side slopes and at the lower elevations on piedmont fans, and the Hap soil generally is in the less sloping areas at the higher elevations on piedmont fans.

Included in this unit are small areas of soils that have a very gravelly clay loam subsoil and are in positions similar to those of the Tres Hermanos and Hap soils, Chamberino and Nickel soils on the steeper side slopes, and deep nongravelly soils in narrow drainageways. Included areas make up about 15 percent of the total acreage.

The Tres Hermanos soil is deep and well drained. It formed in gravelly mixed alluvium. The surface is covered with a weak desert pavement. Typically, the surface layer is light brown gravelly loam about 3 inches thick. The subsoil is brown gravelly clay loam about 13 inches thick. The substratum to a depth of 60 inches or more is pink extremely gravelly loam and extremely gravelly sandy loam.

Permeability of the Tres Hermanos soil is moderately slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Hap soil is deep and well drained. It formed in gravelly mixed alluvium. The surface is covered with a weak desert pavement. Typically, the surface layer is brown very gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly sandy clay loam, and the lower 13 inches is yellowish red gravelly clay loam. The substratum to a depth of 60 inches or more is pink very gravelly sandy clay loam and very cobbly sandy clay loam.

Permeability of the Hap soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, watershed, wildlife habitat.

The potential natural plant community on the Hap soil is characterized by black grama, bush muhly, cane bluestem, sideoats grama, blue grama, yucca, and sotol. The average annual production of air-dry vegetation ranges from 675 pounds per acre in favorable years to 275 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, and cane bluestem decrease, and there is an increase in fluffgrass, threeawn, tobosa, broom snakeweed, creosotebush, and annual forbs.

The potential natural plant community on the Tres Hermanos soil is characterized by bush muhly, black grama, cane bluestem, and creosotebush. The average annual production of air-dry vegetation ranges from 450 pounds per acre in favorable years to 150 pounds in unfavorable years. As the plant community deteriorates, bush muhly, black grama, and cane bluestem decrease,



and there is an increase in creosotebush, fluffgrass, mariola, broom snakeweed, and annual forbs. Eventually, creosotebush dominates the plant community.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of water erosion.

**83—Urban land.** This unit consists of areas in Truth or Consequences that are covered by streets, parking lots, buildings, and other structures. A small part of the unit immediately south of Geronimo Springs has a high water table at a depth of 30 to 72 inches.

**84—Ustorthents dissected-Ildfonso complex, extremely steep.** This map unit is on dissected piedmonts. Slope is 35 to 150 percent. Areas are irregular in shape and are 60 to 480 acres. The native vegetation is mainly grass. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the average frost-free period is 140 to 180 days.

This unit is 45 percent Ustorthents, dissected, 35 to 150 percent slopes, and 25 percent Ildfonso very gravelly sandy loam, 35 to 75 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of deep gravelly loam or gravelly clay loam. Also included are small areas of Badland, Rock outcrop, and arroyos. Included in the unit at higher elevations on north-facing side slopes along the western boundary of the survey area are soils that are darker in color; these soils make up about 5 percent of the unit. The included areas make up about 30 percent of the total acreage.

Ustorthents are deep and well drained. They formed in mixed alluvium and colluvium. A sample profile has a light brown very gravelly sandy loam surface layer about 10 inches thick, over pink, highly stratified very gravelly or very cobbly loam or sandy loam that extends to a depth of 60 inches or more.

Permeability of the Ustorthents is moderate to rapid. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Ildfonso soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light brown very gravelly sandy loam about 4 inches thick. The subsoil is light brown very gravelly sandy loam about 6 inches thick. The substratum to a depth of 60 inches or more is pink and light brown very gravelly loam and very gravelly sandy loam. Stratified sediment of the Santa Fe Formation is below a depth of 40 inches.

Permeability of the Ildfonso soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat. The steeper areas are not suited to livestock grazing.

The potential natural plant community on this unit is characterized by black grama, sideoats grama, blue grama, and shrubs, such as sacahuista, and oak. The estimated annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 375 pounds in unfavorable years. As the plant community deteriorates, black grama, sideoats grama, and blue grama decrease, and there is an increase in threeawn, dropseed, shrubs, cactus, and annual forbs. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the steepness of slope and the hazard of water erosion.

**85—Wink silt loam, gently sloping.** This deep, well drained soil is in drainageways on piedmonts. It formed in mixed alluvium. Slope is 0 to 5 percent. Areas are elongated and are 100 to 640 acres. The native vegetation is mainly grass. Elevation is 4,100 to 5,000 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface layer is dark brown silt loam about 4 inches thick. The subsoil is reddish yellow sandy loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish yellow sandy loam. Some small areas along the border of mapped areas have a sandy clay loam surface layer.

Included in this unit are small areas of Dona Ana soils that are generally on the higher ridges and Reakor soils on adjoining benches. Included areas make up about 45 percent of the total acreage.

Permeability of this Wink soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to occasional, very brief periods of flooding during June through September in 2 years out of 5.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is characterized by tobosa, vine-mesquite, alkali sacaton, and scattered woody plants. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 600 pounds in



unfavorable years. Deterioration of the plant community on this unit is associated with long-term excessive use, largely along trails or roads. Severe deterioration results in the growth of heavy stands of mesquite and in reduced forage production and accessibility to livestock. Less severe deterioration is characterized by an increase in burrograss, threeawn, annuals, and woody plants.

This unit is suited to such rangeland management practices as proper grazing use, livestock water developments, fencing, and planned grazing systems. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazards of water erosion and soil blowing.

**86—Wink-Dona Ana association, gently sloping.**

This map unit is on piedmonts. Slope is 1 to 5 percent. Areas are irregular in shape and are 300 to 800 acres in size. The native vegetation is mainly grass and scattered shrubs and forbs. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 58 to 65 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 55 percent Wink loamy fine sand, 1 to 5 percent slopes, and 25 percent Dona Ana fine sandy loam, 1 to 5 percent slopes. The Wink soil is on side slopes of drainageways and ridgetops, and the Dona Ana soil is in depressional areas and along drainageways.

Included in this unit are small areas of Cruces and Cacique soils that are generally in the slightly higher positions. Also included are areas of Mimbres and Reakor soils on benches and scattered sand dunes throughout the unit. Included areas make up about 20 percent of the total acreage.

The Wink soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown loamy fine sand about 2 inches thick. The subsoil is light brown fine sandy loam 18 inches thick. The substratum

to a depth of 60 inches or more is pink gravelly sandy loam. The coarse fragments are hard caliche nodules.

Permeability of the Wink soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

The Dona Ana soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The upper 10 inches of the subsoil is light brown sandy clay loam, and the lower 4 inches is light brown sandy loam that is about 15 percent gravel. The substratum to a depth of 60 inches or more is pink sandy loam that is about 15 percent caliche gravel.

Permeability of the Dona Ana soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for livestock grazing, watershed, and wildlife habitat.

The potential natural plant community on this unit is characterized by black grama, mesa dropseed, sand dropseed, bush muhly, cane bluestem, threeawn, and soap-tree yucca. The average annual production of air-dry vegetation ranges from 650 pounds per acre in favorable years to 225 pounds in unfavorable years. As the plant community deteriorates, black grama, bush muhly, and cane bluestem decrease, and there is an increase in the dropseed, threeawn, fluffgrass, broom snakeweed, and annual forbs that normally are present in small amounts in the potential plant community. Mesquite invades in some areas.

This unit is suited to such rangeland management practices as proper grazing use, fencing, livestock water developments, planned grazing systems, and chemical brush control. It has limited suitability for practices such as rangeland seeding and mechanical brush control because of the low rainfall and the hazard of soil blowing.







# Prime Farmland

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Prime farmland, as defined by the United States Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It must be used for producing either food or fiber or be available for these uses. It has the soil quality, length of growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is managed properly. Prime farmland produces the highest yields with minimal energy and economic resources and causes the least disturbance to the environment.

Prime farmland commonly has an adequate and dependable supply of moisture from precipitation or irrigation. It also has a favorable temperature and length of growing season and an acceptable level of acidity or alkalinity. It has few, if any, rock fragments and is permeable to water and air. The slope is no more than 6 percent. Prime farmland is not excessively eroded or saturated with water for long periods and is not flooded during the growing season. Soils that are limited by a hazard of flooding may qualify for prime farmland if this limitation is overcome. Onsite investigation is needed to determine the extent of this limitation.

About 42,447 acres, or about 2.2 percent, of the survey area would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available. At present, however, only about 6,562 acres, or less than 1 percent of the area, is irrigated. The major irrigated areas are on the Rio Grande flood plain, south of the town of Truth or Consequences. The major crops grown are corn for silage, cotton, lettuce, chili peppers, wheat, and alfalfa hay.

The following map units meet the soil requirements for prime farmland when irrigated. This list does not constitute a recommendation for a particular land use.

- |    |                           |
|----|---------------------------|
| 1  | Adelino loam              |
| 2  | Agua loam                 |
| 6  | Anapra clay loam          |
| 8  | Anthony-Vinton loams      |
| 9  | Anthony-Vinton clay loams |
| 35 | Glendale loam             |
| 36 | Glendale clay loam        |
| 41 | Harkey loam               |
| 43 | Harkey clay loam          |
| 57 | Mimbres silt loam         |
| 58 | Mimbres clay loam         |







# Use and Management of the Soils

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This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Crops and Pasture

By Paul Boden, state resource conservationist, Soil Conservation Service.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified, and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 10,000 acres of the survey area is used for irrigated crops. About 9,000 acres of this is along the Rio Grande and Palomas Valleys. The remaining 1,000 acres is in small isolated areas in several small valleys scattered throughout the western part of the survey area. Most of the water is supplied by canals from diversions along the Rio Grande River and from Elephant Butte and Caballo Dams. Supplementary water is supplied from irrigation wells. Water in the Palomas Valley and most isolated areas is supplied by stream diversions and wells.

Irrigation water in the Rio Grande Valley is adequate for good crop yields. In other areas, the streams sometimes have little flow during July and August and sufficient quantity is not available from wells.

The main crops grown in the survey area are alfalfa for hay, corn for silage, cotton lint, lettuce, chili peppers, and wheat. Among other crops grown are onions and pecans. The potential is good for high yields.

The major objectives in cropland management are proper irrigation, maintaining good soil tilth and fertility, and controlling water erosion and soil blowing. In addition, reducing excess salinity and alkalinity and providing adequate drainage are needed on some soils.

Timely application of adequate amounts of irrigation water without overirrigating is essential for high yields and efficient use of water. Use of a properly designed irrigation system based on the soil characteristics and crops to be grown improves the chances of reaching this goal. Overirrigation leaches plant nutrients out of the root zone, contributes to excess wetness in the lower lying soils, and reduces yields by reducing aeration of the root zone.

Use of a cropping system that helps to maintain good soil tilth is desirable. Some soils can be used for a single crop for many years with little adverse effect on yields. Other soils deteriorate rapidly unless large amounts of organic matter are returned to the soil annually. Use of a cropping system tailored to the individual soil helps to maintain good soil tilth, structure, aeration, and fertility.



Rotation of crops also reduces insect, disease, and weed infestations.

Water erosion is not a serious problem on most irrigated soils in the area; however, poorly designed irrigation systems may contribute to excessive erosion in the more sloping areas. Land smoothing or leveling is desirable on some of the soils to reduce runoff. Placing irrigation furrows on the contour or across the slope and proper management of crop residue also reduces water erosion.

Soil blowing is a serious problem on the sandy soils in the area. It can best be controlled by leaving an adequate amount of residue from previous crops on the surface until the crop being grown provides ground cover. Cropping in strips perpendicular to the prevailing wind and planting trees and other plants for windbreaks are also effective and desirable practices.

Overirrigation and seepage from irrigation canals have contributed to the high water table and poor drainage of some of the soils on flood plains and valley sides. Alkalinity or salinity, or both, normally increase in poorly drained soils to a level that is detrimental to plant growth. Surface or subsurface drains can be installed to improve drainage and thus reduce salinity and alkalinity; however, using proper irrigation in the higher lying areas and lining irrigation canals are desirable to effectively lower the water table in many years.

Yield of annual crops and hay crops can be increased by other good management practices. These include proper irrigation, use of improved crop varieties, timely planting and harvesting, and a good fertilizer program that is based on the needs of the soil and the crops grown.

### **Yields per Acre**

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 3 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

### **Rangeland**

By James C. Powell, range conservationist, Soil Conservation Service.

Rangeland is land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. In areas that have similar climate and topography, the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on knowledge about the relationship between the soils and vegetation and water.

The potential natural plant community and the average annual production of vegetation in favorable and unfavorable years is given for each soil in the section "Detailed Soil Map Units."

The potential natural plant community is the association of plants that are best adapted to a unique combination of environmental factors. Even on the same soil, the proportion of these plants varies from place to place and from year to year. The dominant plant or plants are used to characterize the plant community because of their relative stability in areas where abnormal disturbance or deterioration has not occurred. The grasses, forbs, and shrubs that characterize the potential natural plant community on each major soil are listed by common name.

Once the plant community has been characterized for each soil, similar plant communities are grouped into range sites. A range site is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from other natural plant communities in kind, amount, or proportion of range plants. Soil properties that have the greatest influence on the productivity of range plants are those that affect the availability of moisture and plant nutrients. Other soil properties, such as soil reaction, salt content, and the presence or absence of a high water table during any period of the year, are also important factors in differentiating range sites. Range site descriptions can



be used to identify the proportions of the total annual production of each plant. Information on the range sites in this survey area is available in the local office of the Soil Conservation Service.

The average annual production is the amount of air-dry vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. The total production that can be used for forage depends upon the kind of grazing animals, the season of use, and other factors. The average annual production includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable and unfavorable years. In a favorable year, the amount and distribution of precipitation and the soil and air temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition ratings (excellent, good, fair, and poor) are determined by comparing the present plant community with the potential natural plant community in a particular range site. The more closely the existing community resembles the potential community, the better the range condition.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Approximately 96 percent of the survey area is rangeland that supports grasses, forbs, and shrubs that are suitable for grazing. In addition, about 1 percent of the area is pinyon, juniper, and ponderosa pine woodland that produces grazable understory vegetation. Cow and calf operations are dominant, but some ranches have yearling operations. Livestock produced on these ranches provides the principal agricultural income.

Management of grazing to increase ground cover, accumulate litter, and improve the vigor and reproduction of the more productive grasses and shrubs is highly desirable. Continuous yearlong grazing or grazing every year during the growing season, from April through October, results in a deteriorated plant community that is generally of reduced value as forage.

A proper degree of grazing use combined with deferred grazing, which varies the seasons of grazing and rest in pastures during successive years, is needed to maintain a healthy, balanced plant community and to provide high quality forage throughout the year. Rest in summer encourages the production and reproduction of warm-season grasses such as sideoats grama, black grama, tobosa, cane bluestem, and blue grama. Rest in spring is beneficial to cool-season grasses such as New Mexico feathergrass and bottlebrush squirreltail. Rest during fall and winter benefits shrubs such as fourwing saltbush and winterfat.

Flexibility in livestock and wildlife numbers and in the frequency and intensity of grazing is essential to the success of any grazing program. Effective livestock distribution is most traditionally accomplished by the use of fences, livestock water developments, and livestock salting.

## Recreation

The soils of the survey area are rated in table 4 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 4, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 4 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 7 and interpretations for dwellings without basements and for local roads and streets in table 8.

*Camp areas* require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to



heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

*Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

*Paths and trails* for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

## Wildlife Habitat

By William J. Slone, biologist, Soil Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 5, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, brome grass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally established plants that provide food and cover for wildlife. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are black grama, sideoats grama, tobosa, bush muhly, dropseed, alkali sacaton, lambsquarters, globemallow, and buckwheat.

*Coniferous plants* furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pinyon, cedar, and juniper.

*Shrubs* are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mesquite, oak,



fourwing saltbush, skunkbush sumac, mountainmahogany, yucca, and creosotebush.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are saltgrass, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include quail, mourning dove, meadowlark, rabbit, and pocket gopher.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, and beaver.

*Habitat for rangeland wildlife* consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, mule deer, spotted ground squirrel, badger, meadowlark, lark bunting, kangaroo rat, and quail.

## Engineering

By Robert P. Henrich, area engineer, Soil Conservation Service.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations.*

*For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

### Building Site Development

Table 6 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site



features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

*Dwellings and small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper

40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

### Sanitary Facilities

Table 7 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 7 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level



floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 7 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage because of rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

*Sanitary landfills* are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 7 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover

for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

### Construction Materials

Table 8 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet.



Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

*Sand and gravel* are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 8, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

## Water Management

Table 9 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Drainage* is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that



affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the drainage ratings.

*Irrigation* is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected

by the depth of the root zone, the amount of salts or sodium, and soil reaction.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.







# Soil Properties

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Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

## Engineering Index Properties

Table 10 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the Unified soil classification system (2, 3) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit* and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The



estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

## Physical and Chemical Properties

Table 11 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

*Permeability* refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Soil reaction* is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For

many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

*Shrink-swell potential* is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

*Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (up to 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.



*Wind erodibility groups* are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the amount of stable aggregates 0.84 millimeter in size. These are represented idealistically by USDA textural classes. Soils containing rock fragments can occur in any group.

1. Sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition.

In table 11, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

## Soil and Water Features

Table 12 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

*Flooding*, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 12 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic



matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

*High water table* (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 12 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 12.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

*Depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or

fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

*Potential frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.



# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (5). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 13 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**ORDER.** Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

**SUBORDER.** Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Fluvent (*Fluv*, meaning river, plus *ent*, from Entisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Torrifluvents (*Torri*, meaning hot and dry, plus *fluv*, the suborder of the Entisols that formed in water-deposited sediment).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Torrifluvents.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties

and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed (calcareous), thermic Typic Torrifluvents.

**SERIES.** The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (4). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (5). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

### Adelino Series

The soils in the Adelino series are classified as Typic Camborthids, fine-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on terraces, alluvial fans, and benches of old flood plains. Slope is 0 to 1 percent. Elevation is 4,150 to 4,350 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Adelino loam, about 0.8 mile south of Arrey, in the SE1/4NW1/4 of sec. 14, T. 17 S., R. 5 W.



- Ap—0 to 12 inches; pale brown (10YR 6/3) loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.
- B21—12 to 24 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- B22ca—24 to 30 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine interstitial pores; strongly effervescent; calcium carbonate disseminated and as few fine soft masses; moderately alkaline; clear smooth boundary.
- Cca—30 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine interstitial pores; about 14 percent gravel in the lower part; strongly effervescent; calcium carbonate disseminated and as few fine soft masses; moderately alkaline.

The reaction is moderately alkaline or strongly alkaline.

The A horizon is light brown or pale brown. The B horizon is yellowish brown or brown. A slight increase in calcium carbonate occurs in the lower part. The C horizon is grayish brown, brown, or pale brown loam, clay loam, or silty clay loam and is 1 to 15 percent coarse fragments.

## Agua Series

The soils in the Agua series are classified as Typic Torrifluvents, coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 1 percent. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees, and the frost-free period is 180 to 220 days.

Typical pedon of Agua loam, about 15 miles south of Truth or Consequences, in the SE1/4SE1/4NE1/4 of sec. 12, T. 17 S., T. 5 W.

- Ap—0 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many very fine interstitial pores and common very fine tubular pores; strongly effervescent; disseminated calcium

carbonate; moderately alkaline; clear smooth boundary.

- C1—12 to 18 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many very fine interstitial pores and common fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- C2—18 to 33 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial and tubular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.
- IIC3—33 to 35 inches; pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.
- IIIC4—35 to 50 inches; pale brown (10YR 6/3) sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- IIIC5—50 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline.

Some areas have a fluctuating water table between depths of 60 and 84 inches. Depth to the IIC horizon is 20 to 36 inches.

The A horizon is pale brown, brown, or dark brown.

## Agustin Series

The soils in the Agustin series are classified as Typic Camborthids, coarse-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on alluvial fans. Slope is 1 to 9 percent. Elevation is 4,100 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Agustin gravelly sandy loam, 1 to 9 percent slopes, about 3 miles west of Caballo Dam; 500 feet south of the northwest corner of the SW1/4 of sec. 22, T. 16 S., R. 5 W.

- A1—0 to 6 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist; weak coarse platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; about 25 percent igneous gravel;



strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B2—6 to 20 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; about 20 percent igneous gravel and a trace of cobbles; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1ca—20 to 36 inches; pink (7.5YR 7/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; about 35 percent gravel and a few cobbles; thin patchy coatings of calcium carbonate on coarse fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—36 to 60 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; about 20 percent gravel and 5 percent cobbles; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Thickness of the solum ranges from 15 to 30 inches. Coarse fragments are mostly igneous gravel and make up 15 to 35 percent of the profile.

The A horizon is noneffervescent in some pedons. The B2 horizon is 15 to 35 percent gravel, a trace to 10 percent cobbles, and 5 to 17 percent clay. The C1ca horizon averages 15 to 35 percent gravel and cobbles, but it commonly has thin strata that are 35 to 50 percent gravel and cobbles. Calcium carbonate equivalent ranges from 5 to 15 percent.

## Akela Series

The soils in the Akela series are classified as Lithic Torriorthents, loamy-skeletal, mixed (calcareous), thermic. These shallow, well drained soils formed in material derived dominantly from basalt. They are on basalt lava flows. Slope is 1 to 30 percent. Elevation is 4,100 to 6,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Akela very gravelly loam, moderately rolling, about 6 miles east of Truth or Consequences, near the northeast corner of the SE1/4SE1/4 of sec. 9, T. 14 S., R. 3 W.

A1—0 to 3 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; 45 percent basalt gravel and 5 percent basalt cobbles;

strongly effervescent; moderately alkaline; clear smooth boundary.

C1—3 to 9 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; 30 percent basalt gravel and a trace of basalt cobbles and stones; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2ca—9 to 14 inches; pink (7.5YR 7/4) very gravelly loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; 40 percent basalt gravel and 10 percent basalt cobbles and stones; violently effervescent; disseminated calcium carbonate; moderately alkaline; abrupt wavy boundary.

R—14 inches; coated with caliche basalt.

Depth to bedrock is 4 to 20 inches. The profile is mildly alkaline or moderately alkaline. It is 35 to 75 percent coarse fragments.

The A horizon is very gravelly loam or cobbly loam. The C1 horizon is pale brown, light brown, or light yellowish brown gravelly loam or very gravelly loam. The C2ca horizon is pink or pale brown.

## Anapra Series

The soils in the Anapra series are classified as Typic Torrifluvents, fine-silty over sandy or sandy-skeletal, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are on the flood plain of the Rio Grande. Slope is 0 to 1 percent. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Anapra clay loam, about 15 miles south of Truth or Consequences, 750 feet south of the road and 20 feet west of the Arrey Canal, in the NW1/4NE1/4NW1/4 of sec. 13, T. 17 S., R. 5 W.

A1—0 to 11 inches; light brownish gray (10YR 6/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; common very fine interstitial and tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—11 to 17 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; common very fine interstitial and tubular pores; strongly



effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—17 to 24 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; common very fine interstitial and tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

C3—24 to 29 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; massive; very hard, very firm, sticky and plastic; few very fine interstitial and tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

IIC4—29 to 38 inches; pale brown (10YR 6/3) loamy sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

IIC5—38 to 60 inches; pale brown (10YR 6/3) sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline.

Depth to the IIC horizon is 18 to 36 inches.

## Anthony Series

The soils in the Anthony series are classified as Typic Torrifluvents, coarse-loamy, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 1 percent. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Anthony loam in an area of Anthony-Vinton loams, about 15 miles south of Truth or Consequences, 900 feet north of the southwest corner of the NE1/4 of sec. 12, T. 17 S., R. 5 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

A12—9 to 17 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine interstitial and tubular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C1—17 to 26 inches; light brownish gray (10YR 6/2) fine sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; common fine interstitial pores and few fine tubular pores; violently effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

C2—26 to 34 inches; light gray (10YR 7/2) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, slightly sticky and slightly plastic; many fine interstitial pores and few fine tubular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C3—34 to 40 inches; light brownish gray (10YR 6/2) fine sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine interstitial pores and few fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

C4—40 to 49 inches; pale brown (10YR 6/3) sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine interstitial pores and few fine tubular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C5—49 to 56 inches; pale brown (10YR 6/3) loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine interstitial pores and few fine tubular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C6—56 to 60 inches; brown (10YR 5/3) sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine interstitial pores and few fine tubular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline.

The A horizon is brown or grayish brown clay loam, loam, or fine sandy loam. The C horizon is pale brown, grayish brown, light brownish gray, brown, light gray, or light brown, stratified loam, fine sandy loam, sand, and loamy fine sand.

## Aridic Argiustolls

Aridic Argiustolls are shallow to deep, well drained soils on truncated side slopes of old alluvial fan terraces on hills and mesas. These soils formed in mixed alluvium and colluvium over basalt or cemented conglomerate. Slope is 35 to 95 percent. Elevation is 5,300 to 6,800 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 54 to 58 degrees F, and the frost-free period is 140 to 180 days.

Sample pedon of Aridic Argiustolls in an area of Aridic Argiustolls-Goldust association, extremely steep, about



18 miles west of Truth or Consequences; about 1,320 feet north and 1,000 feet east of the southwest corner of sec. 9, T. 14 S., R. 7 W.

A1—0 to 4 inches; brown (10YR 4/3) very gravelly clay loam, black (10YR 2/1) moist; moderate medium and fine granular structure; slightly hard, friable, sticky and slightly plastic; many fine roots; common fine tubular pores and common very fine interstitial pores; 50 percent of surface covered with gravel, cobbles, and stones; 5 percent cobbles and 25 percent igneous gravel in horizon; neutral; clear smooth boundary.

B21t—4 to 12 inches; brown (7.5YR 4/2) very gravelly clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common moderately thick clay films on faces of peds; common fine roots; common very fine interstitial pores; 10 percent cobbles and 40 percent igneous gravel; neutral; clear smooth boundary.

C—12 to 28 inches; brown (7.5YR 5/4) extremely gravelly sandy clay, brown (7.5YR 4/4) moist; massive; hard, firm, sticky and plastic; few fine roots; common very fine interstitial pores; 15 percent cobbles and 70 percent igneous gravel; mildly alkaline; abrupt wavy boundary.

R—28 inches; conglomerate; partially weathered in the upper 2 inches.

Depth to underlying conglomerate, acid igneous rock, or basalt is 10 to 60 inches or more. The profile is neutral to moderately alkaline. It is 15 to 90 percent coarse fragments throughout. The C1 horizon is absent in some areas where bedrock is at a depth of less than 24 inches. The horizon has common thin strata that are 35 to 90 percent coarse fragments. They are sandy clay, sandy clay loam, or sandy loam.

## Aridic Haplustalfs

Aridic Haplustalfs are shallow to moderately deep, well drained soils on hillsides and mountainsides. These soils formed in colluvium derived from mixed igneous rock. Slope is 15 to 95 percent. Elevation is 6,500 to 8,300 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 47 to 55 degrees F, and the frost-free period is 140 to 170 days.

Sample pedon of Aridic Haplustalfs in an area of Aridic Haplustalfs-Rock outcrop complex, extremely steep, about 9 miles northeast of Winston, near the southeast corner of sec. 2, T. 10 S., R. 8 W.

A1—0 to 3 inches; brown (7.5YR 4/2) cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; common fine

interstitial pores; 10 percent igneous cobbles and 10 percent gravel; neutral; clear smooth boundary.

B21t—3 to 9 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common thin clay films on faces of peds and coarse fragments; common fine roots; many fine interstitial pores; 2 percent stones, 10 percent cobbles, and 30 percent gravel; neutral; clear smooth boundary.

B22t—9 to 12 inches; light brown (7.5YR 6/4) very cobbly clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common thin clay films on faces of peds and coarse fragments; common fine roots; many fine interstitial pores; 2 percent stones, 15 percent cobbles, and 25 percent gravel; neutral; abrupt smooth boundary.

R—12 inches; rhyolite; partially weathered in upper 3 inches.

The solum ranges from 4 to 40 inches in thickness within short distances. Content of coarse fragments is 10 to 60 percent.

## Arizo Series

The soils in the Arizo series are classified as Typic Torriorthents, sandy-skeletal, mixed, thermic. These deep, excessively drained soils formed in mixed alluvium. They are on alluvial fans, flood plains, and small valley floors. Slope is 0 to 3 percent. Elevation is 4,100 to 5,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Arizo very gravelly sandy loam in an area of Arizo and Canutio soils, gently sloping, about 10 miles northwest of Truth or Consequences, near the center of the SW1/4SE1/4 of sec. 36, T. 13 S., R. 5 W.

A1—0 to 4 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial pores; 45 percent igneous gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—4 to 60 inches; light brown (7.5YR 6/4) very gravelly loamy sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots to a depth of 18 inches and few fine roots to a depth of 36 inches; common fine interstitial pores; 50 percent igneous gravel; strongly effervescent; disseminated calcium carbonate and few thin patchy coatings of calcium carbonate on undersides of coarse fragments; moderately alkaline.



Content of coarse fragments averages 35 to 75 percent, of which 5 to 20 percent is cobbles and stones. The profile is mildly alkaline or moderately alkaline.

The A horizon is light grayish brown or light brown very gravelly sandy loam or very gravelly loamy sand. The C horizon is pale brown, light brown, or light grayish brown very gravelly loamy sand or very gravelly sand.

### Armijo Series

The soils in the Armijo series are classified as Typic Torrierts, fine, montmorillonitic, thermic. These deep, well drained soils formed in mixed alluvium. They are in swales and on flood plains and basin floors. Slope is 0 to 3 percent. Elevation is 4,100 to 4,700 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Armijo clay, 0 to 3 percent slopes, about 5 miles east of the Upham Railroad Siding, near the southeast corner of sec. 21, T. 16 S., R. 1 W.

A1—0 to 5 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 3/4) moist; moderate fine platy structure parting to moderate fine granular; hard, friable, sticky and plastic; many fine roots; common fine tubular pores and common very fine interstitial pores; common cracks at least 1 inch wide; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—5 to 34 inches; brown (7.5YR 5/4) clay, brown (7.5YR 4/4) moist; weak coarse prismatic and subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; few fine tubular pores and common very fine interstitial pores; common slickensides and pressure faces; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

C2—34 to 60 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine tubular pores and common very fine interstitial pores; few fine gypsum crystals; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Gilgai microrelief ranges from 3 to 10 inches in height in undisturbed areas. The profile is mildly alkaline to strongly alkaline. It is slightly alkali-affected or moderately alkali-affected throughout. The C horizon is brown clay or silty clay and is 35 to 60 percent clay. Depth to the gypsum crystals is 40 to 60 inches or more.

### Belen Series

The soils in the Belen series are classified as Vertic Torrifluvents, clayey over loamy, montmorillonitic (calcareous), thermic. These deep, well drained soils

formed in mixed alluvium. They are on flood plains of the Rio Grande. Slope is 0 to 1 percent. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Belen clay loam, about 1,250 feet east and 700 feet north of the southwest corner of sec. 12, T. 17 S., R. 5 W.

Ap—0 to 13 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—13 to 21 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, sticky and plastic; few fine roots; common very fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—21 to 28 inches; light brownish gray (10YR 6/2) clay, dark gray (10YR 4/1) moist; massive; hard, very firm, sticky and plastic; common very fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

IIC3—28 to 37 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 5/3) moist; massive; loose, very friable, slightly sticky and slightly plastic; many very fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

IIIC4—37 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; loose, nonsticky and nonplastic; many very fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Depth to the IIC horizon is 20 to 36 inches. The upper part of the C horizon is clay or silty clay. The lower part is pale brown or light grayish brown silt loam to fine sandy loam and averages 10 to 20 percent clay.

### Berino Series

The soils in the Berino series are classified as Typic Haplargids, fine-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 7 percent. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Berino loamy fine sand in an area of Berino-Dona Ana association, gently sloping, about



1,300 feet east and 660 feet north of the southwest corner of sec. 12, T. 13 S., R. 2 W.

A1—0 to 3 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; many fine interstitial pores; mildly alkaline; clear smooth boundary.

B1t—3 to 12 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many fine and medium roots; common fine interstitial pores; few thin clay films bridging sand grains; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21tca—12 to 20 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine interstitial and tubular pores; few thin clay films and many thin clay bridges; strongly effervescent; few thin filaments of calcium carbonate; moderately alkaline; abrupt wavy boundary.

B22tca—20 to 32 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; strong medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; many fine interstitial pores and few fine tubular pores; common thin clay films on faces of peds and as bridges; strongly effervescent; few fine filaments of calcium carbonate and few medium soft masses of calcium carbonate; moderately alkaline; gradual smooth boundary.

Cca—32 to 60 inches; pink (5YR 8/3) loam, pink (5YR 7/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine roots; many fine interstitial pores; violently effervescent; disseminated calcium carbonate; moderately alkaline.

Thickness of the solum is 24 to 40 inches.

The A horizon is brown, strong brown, yellowish red, or reddish brown. The Bt horizon is yellowish red or reddish brown. The C horizon is reddish yellow or pink loam or sandy loam.

### Bluepoint Series

The soils in the Bluepoint series are classified as Typic Torripsamments, mixed, thermic. These deep, somewhat excessively drained soils formed in sandy mixed alluvium that has been modified by wind. They are on piedmonts, alluvial fans, and terraces. Slope is 1 to 15 percent. Elevation is 4,050 to 5,200 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Bluepoint loamy fine sand, moderately rolling, about 2 miles southwest of Truth or Consequences, near the southwest corner of the SE1/4 of sec. 8, T. 14 S., R. 3 W.

C1—0 to 10 inches; yellowish brown (10YR 5/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; mildly alkaline; clear smooth boundary.

C2—10 to 60 inches; light yellowish brown (10YR 6/4) fine sand, yellowish brown (10YR 5/4) moist; massive; loose, nonsticky and nonplastic; few fine roots to a depth of 30 inches; common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The C1 horizon is light brownish gray, yellowish brown, or light yellowish brown fine sand, loamy fine sand, or loamy sand. The C2 horizon is light brownish gray, yellowish brown, or light yellowish brown loamy sand, loamy fine sand, or fine sand. It is stratified in some pedons. Calcium carbonate equivalent ranges from a trace to 8 percent.

### Brazito Series

The soils in the Brazito series are classified as Typic Torripsamments, mixed, thermic. These deep, excessively drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 5 percent. Elevation is 4,050 to 5,200 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Brazito loamy fine sand, gently sloping, about 2.5 miles southwest of Truth or Consequences, near the center of the SE1/4SE1/4 of sec. 18, T. 14 S., R. 4 W.

A1—0 to 6 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—6 to 60 inches; pale brown (10YR 6/3) sand stratified with loamy fine sand and fine sand, brown (10YR 5/3) moist; massive; loose, nonsticky and nonplastic; few fine roots to a depth of 24 inches; common fine interstitial pores; 5 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The profile is mildly alkaline or moderately alkaline. Some pedons have a fluctuating water table at a depth of 2 to 5 feet.



The A horizon is pale brown or light brownish gray very fine sandy loam or loamy fine sand. The C horizon is pale brown or light brownish gray, stratified sand, fine sand, loamy fine sand, or loamy very fine sand to a depth of 60 inches or more. It averages less than 15 percent gravel and ranges from noneffervescent to 8 percent calcium carbonate equivalent.

### Cabazon Series

The soils in the Cabazon series are classified as Lithic Argiustolls, clayey, montmorillonitic, mesic. These shallow, well drained soils formed in residuum and eolian material derived dominantly from basalt on lava flows. Slope is 1 to 15 percent. Elevation is 5,200 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 50 to 58 degrees F, and the frost-free period is 120 to 180 days.

Typical pedon of Cabazon gravelly clay loam in an area of Thunderbird-Cabazon association, moderately rolling, about 5 miles east and 4.5 miles north of Hermosa, about 1,000 feet north and 1,000 feet west of the southeast corner of the NW1/4 of sec. 35, T. 12 S., R. 8 W.

A1—0 to 4 inches; brown (7.5YR 4/4) gravelly clay loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; about 25 percent gravel and 5 percent cobbles; neutral; clear smooth boundary.

B21t—4 to 9 inches; brown (7.5YR 4/4) gravelly clay loam, dark brown (7.5YR 3/2) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots; common fine interstitial pores; 10 percent gravel and 5 percent cobbles; common moderately thick clay films on faces of peds, bridging mineral grains, and lining pores; neutral; gradual smooth boundary.

B22t—9 to 12 inches; brown (7.5YR 4/4) gravelly clay loam, dark brown (7.5YR 3/2) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; common fine interstitial pores; 25 percent gravel and 5 percent cobbles; common moderately thick clay films on faces of peds, bridging mineral grains, and lining pores; neutral; abrupt wavy boundary.

R—12 inches; basalt.

Thickness of the solum and depth to bedrock range from 4 to 20 inches. The profile is 15 to 35 percent coarse fragments. The B horizon is effervescent in some pedons.

### Cacique Series

The soils in the Cacique series are classified as Petrocalcic Paleargids, fine-loamy, mixed, thermic. These

moderately deep, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 5 percent. Elevation is 4,050 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Cacique fine sandy loam in an area of Cruces-Cacique complex, hummocky; about 9 miles east of Engle, 500 feet north and 500 feet east of the southwest corner of the SW1/4 of sec. 8, T. 13 S., R. 1 W.

A1—0 to 2 inches; reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/3) moist; weak coarse platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; mildly alkaline; clear smooth boundary.

B1—2 to 6 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; coatings of clay on sand grains; mildly alkaline; clear smooth boundary.

B21t—6 to 17 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial pores; few thin clay films coating and bridging sand grains; mildly alkaline; clear smooth boundary.

B22tca—17 to 24 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; coatings of clay on sand grains; slightly effervescent; few fine filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

B3ca—24 to 29 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; slightly effervescent; disseminated calcium carbonate; common medium caliche fragments the size of gravel; moderately alkaline; abrupt wavy boundary.

C1cam—29 to 49 inches; indurated pinkish white (5YR 8/2) caliche; gravel-sized caliche and coarse fragments are cemented; fragments are extremely hard; surface of fragments is coated with an extremely hard laminar layer 1/16 to 1/4 inch; clear smooth boundary.

C2cam—49 to 60 inches; indurated caliche occurring as hard nodules cemented together.



The solum ranges from 20 to 40 inches in thickness. The A horizon and upper part of the Bt horizon commonly are noneffervescent but range to effervescent throughout. The Bt horizon is sandy clay loam or heavy fine sandy loam.

### Caliza Series

The soils in the Caliza series are classified as Typic Calciorthids, sandy-skeletal, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on alluvial fans and piedmonts. Slope is 3 to 35 percent. Elevation is 4,100 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Caliza very gravelly sandy loam in an area of Caliza-Bluepoint-Yturbide association, very steep; within the town of Truth or Consequences, near the southeast corner of the SW1/4 of sec. 28, T. 13 S., R. 4 W., on the west side of the road cut.

- A1—0 to 4 inches; brown (7.5YR 5/4) very gravelly sandy loam, brown (7.5 4/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 50 percent igneous gravel; strongly effervescent; disseminated calcium carbonate and few fine coatings of calcium carbonate on coarse fragments; moderately alkaline; clear smooth boundary.
- C1—4 to 12 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 40 percent igneous gravel and few caliche fragments; strongly effervescent; thin calcium carbonate coatings on gravel; moderately alkaline; clear wavy boundary.
- C2ca—12 to 20 inches; pink (7.5YR 7/3) very gravelly loamy sand, light brown (7.5YR 6/4) moist; massive; hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 60 percent igneous gravel; violently effervescent; calcium carbonate disseminated and as thin coatings on coarse fragments and weak bridges between coarse fragments; moderately alkaline; gradual smooth boundary.
- C3ca—20 to 60 inches; light brown (7.5YR 6/4) very gravelly loamy sand, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial pores; 50 percent igneous gravel; strongly effervescent; disseminated calcium carbonate and thin coatings of calcium carbonate on coarse fragments; moderately alkaline.

Depth to the Cca horizon is 4 to 18 inches. Cobbles on the surface and throughout the profile range from a few to 18 percent. Content of gravel and cobbles in the 10- to 40-inch control section is 35 to 75 percent. A weak desert pavement covers as much as 40 percent of the surface in some areas.

The A horizon is brown or light brown.

### Canutio Series

The soils in the Canutio series are classified as Typic Torriorthents, loamy-skeletal, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are on alluvial fans and flood plains associated with arroyos. Slope is 1 to 15 percent. Elevation is 4,100 to 5,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Canutio very gravelly sandy loam in an area of Canutio-Pajarito association, moderately rolling, about 14 miles north of Truth or Consequences; near the northwest corner of the NE1/4 of sec. 31, T. 11 S., R. 3 W.

- A1—0 to 4 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 50 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- C1—4 to 14 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 35 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- C—14 to 24 inches; light brown (7.5YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine and medium interstitial pores; 70 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- C3—24 to 72 inches; light brown (7.5YR 6/4) very gravelly loamy sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine and medium interstitial pores; 55 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline.



The profile averages 35 to 70 percent gravel, and in some pedons it is as much as 10 percent cobbles.

### Cave Series

The soils in the Cave series are classified as Typic Paleorthids, loamy, mixed, thermic, shallow. These shallow, well drained soils formed in mixed alluvium derived dominantly from limestone. They are on piedmonts. Slope is 1 to 15 percent. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Cave gravelly very fine sandy loam in an area of Delnorte-Cave-Tencee complex, moderately rolling, about 8 miles southwest of Truth or Consequences, near the southwest corner of the SE1/4 of sec. 22, T. 15 S., R. 3 W.

A1—0 to 4 inches; brown (7.5YR 5/4) gravelly very fine sandy loam, brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine vesicular and interstitial pores; 25 percent gravel; few fine caliche fragments; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—4 to 12 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; common fine vesicular pores; 20 percent gravel; few gravel-sized caliche fragments; violently effervescent; calcium carbonate disseminated and coating gravel; moderately alkaline; abrupt smooth boundary.

C2cam—12 to 30 inches; extremely hard, cemented gravel and caliche coated with a thin laminated layer.

C3cam—30 to 60 inches; cemented nodules of gravel and caliche that can be broken with a shovel.

Depth to the cemented caliche layer is 4 to 20 inches. The profile is 15 to 35 percent gravel. Reaction is mildly alkaline or moderately alkaline.

The A horizon is brown or light yellowish brown gravelly fine sandy loam or gravelly very fine sandy loam. The C1 horizon is brown, pale brown, very pale brown, or light brown.

### Chamberino Series

The soils in the Chamberino series are classified as Typic Calciorthids, loamy-skeletal, mixed, thermic. These deep, well drained soils formed in gravelly mixed alluvium. They are on piedmonts. Slope is 1 to 15 percent. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average

annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Chamberino gravelly loam in an area of Nickel-Chamberino association, gently sloping, about 16 miles southwest of Truth or Consequences; about 750 feet east and 200 feet south of the northwest corner of the SW1/4 of sec. 35, T. 15 S., R. 5 W.

A11—0 to 1 inch; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak medium platy structure parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; few fine roots; common fine vesicular pores and very fine interstitial pores; 25 percent gravel; weak desert pavement on the surface; strongly effervescent; moderately alkaline; clear smooth boundary.

A12—1 to 4 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; common fine interstitial pores; 20 percent igneous gravel, 10 percent small hard gravel-sized caliche fragments, and 5 percent cobbles; strongly effervescent; moderately alkaline; clear smooth boundary.

B2—4 to 16 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; common fine interstitial pores; 20 percent igneous gravel, 5 percent small hard gravel-sized caliche fragments, and 5 percent cobbles; strongly effervescent; thin patchy calcium carbonate coatings on coarse fragments; moderately alkaline; abrupt wavy boundary.

C1ca—16 to 29 inches; pink (7.5YR 7/4) very gravelly loam, light brown (7.5YR 6/4) moist; massive; very hard, friable and firm, nonsticky and nonplastic; common fine and very fine interstitial pores; 45 percent gravel and 5 percent cobbles; coarse fragments weakly cemented with caliche; some very hard cemented fragments 1 to 10 inches across; violently effervescent; nearly continuous calcium carbonate coatings on coarse fragments; moderately alkaline; abrupt wavy boundary.

C2ca—29 to 60 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial pores; 40 percent igneous gravel, 10 percent cobbles, and 5 percent caliche coarse fragments; violently effervescent; nearly continuous carbonate coatings on coarse fragments; moderately alkaline.

A desert pavement covers as much as 40 percent of the surface in some areas. The profile is mildly alkaline or moderately alkaline. The content of gravel is 30 to 60



percent. Depth to the C1ca horizon is 7 to 30 inches. This horizon is weakly cemented to strongly cemented in the upper part. Where it is strongly cemented, it is highly fractured.

## Continental Series

The soils in the Continental series are classified as Typic Haplargids, fine, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 9 percent. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Continental fine sandy loam in an area of Stellar-Continental association, gently sloping, about 11 miles east of Truth or Consequences; about 500 feet east and 150 feet north of the southwest corner of sec. 9, T. 14 S., R. 2 W.

A11—0 to 2 inches; strong brown (7.5YR 5/6) fine sandy loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; many fine interstitial pores; mildly alkaline; abrupt smooth boundary.

A12—2 to 4 inches; strong brown (7.5YR 4/6) sandy clay loam, dark brown (7.5YR 4/4) moist; strong fine platy and subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; mildly alkaline; abrupt smooth boundary.

B21t—4 to 13 inches; strong brown (7.5YR 5/6) clay, dark brown (7.5YR 4/4) moist; strong medium angular blocky structure parting to strong fine angular blocky; very hard, friable, sticky and plastic; many fine and very fine roots; many fine tubular pores; thick continuous clay films on faces of peds; mildly alkaline; clear smooth boundary.

B22t—13 to 30 inches; light brown (7.5YR 6/4) clay loam, strong brown (7.5YR 5/6) moist; strong medium angular blocky structure; extremely hard, friable, sticky and plastic; common fine roots; common fine tubular and interstitial pores; thick continuous clay films on faces of peds; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

B3tca—30 to 47 inches; reddish yellow (7.5YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many fine interstitial pores; few thin clay films as bridges; strongly effervescent; few medium soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Cca—47 to 60 inches; pink (7.5YR 7/4) sandy clay loam, yellowish brown (10YR 5/6) moist; massive; slightly

hard, very friable, slightly sticky and slightly plastic; few very fine roots; many fine interstitial pores; few thin clay films on faces of peds and in pores; violently effervescent; common medium soft masses of calcium carbonate; moderately alkaline.

Thickness of the solum is 26 to 60 inches.

The A horizon is slightly effervescent in some pedons. The C horizon in some pedons has a caliche layer below a depth of 40 inches.

## Courthouse Series

The soils in the Courthouse series are classified as Lithic Torriorthents, loamy, mixed (calcareous), thermic. These shallow, well drained soils formed in material weathered from sandstone and shale. They are on hills and low mountains. Slope is 1 to 55 percent. Elevation is 4,400 to 6,000 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is about 57 to 65 degrees F, and the frost-free period is 170 to 210 days.

Typical pedon of Courthouse very cobbly very fine sandy loam in an area of Courthouse-Rock outcrop association, very steep; 6 miles west of the Upham railroad siding, near the southeast corner of the SW1/4 of sec. 16, T. 16 S., R. 3 W.

A1—0 to 2 inches; yellowish red (5YR 5/6) very cobbly very fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; 25 percent gravel, 15 percent cobbles, and 5 percent stones; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—2 to 6 inches; yellowish red (5YR 5/6) gravelly loam, yellowish red (5YR 4/6) moist; weak fine angular blocky structure; hard, friable, slightly sticky and nonplastic; common fine roots; common very fine interstitial pores; 25 percent gravel; slightly effervescent; thin patchy calcium carbonate coatings on coarse fragments; moderately alkaline; clear smooth boundary.

C2—6 to 10 inches; red (2.5YR 5/6) gravelly loam, red (2.5YR 4/6) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine roots; common very fine interstitial pores; 30 percent sandstone fragments; strongly effervescent; nearly continuous calcium carbonate coatings on coarse fragments; moderately alkaline; abrupt wavy boundary.

R—10 inches; red sandstone; the surface is covered with a thin patchy layer of caliche.



Depth to bedrock is 4 to 20 inches. The profile averages 15 to 35 percent angular sandstone fragments throughout.

The A horizon is yellowish red, pale brown, or brown very cobbly very fine sandy loam, flaggy loam, or gravelly fine sandy loam. The C horizon is brown, reddish brown, or yellowish red gravelly loam, gravelly sandy clay loam, flaggy sandy clay loam, or gravelly clay loam and is less than 28 percent clay.

### Cruces Series

The soils in the Cruces series are classified as Petrocalcic Paleargids, loamy, mixed, thermic, shallow. These shallow, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 5 percent. Elevation is 4,050 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Cruces sandy loam in an area of Cruces-Cacique complex, hummocky; about 3 miles east of Engle about 500 feet east and 500 feet north of the southwest corner of sec. 8, T. 13 S., R. 1 W.

A1—0 to 1 inch; yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; many fine interstitial pores; mildly alkaline; abrupt smooth boundary.

B21t—1 to 4 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine and fine interstitial and tubular pores; common thin clay films coating and bridging sand grains; mildly alkaline; clear smooth boundary.

B22t—4 to 8 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many very fine interstitial and tubular pores; common thin clay films coating and bridging sand grains; mildly alkaline; gradual smooth boundary.

B23tca—8 to 18 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and few fine roots; common fine and few very fine tubular pores; few thin clay films coating and bridging sand grains; strongly effervescent; common fine calcium carbonate filaments; moderately alkaline; abrupt smooth boundary.

C1cam—18 to 38 inches; indurated pinkish white (5YR 8/2) caliche; clear smooth boundary.

C2cam—38 to 60 inches; cemented pinkish white (5YR 8/2) hard caliche nodules and gravel that can be dug with a hand shovel with difficulty.

Thickness of the solum ranges from 6 to 20 inches. In some areas the A horizon and the upper part of the Bt horizon have been removed by soil blowing.

### Deama Series

The soils in the Deama series are classified as Lithic Calciustolls, loamy-skeletal, carbonatic, mesic. These shallow, well drained soils formed in material weathered from limestone. They are on foothills and low mountains. Slope is 5 to 55 percent. Elevation is 5,100 to 7,800 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 54 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Deama very stony loam in an area of Rock outcrop-Deama association, extremely steep (fig. 16), about 5 miles southeast of Truth or Consequences, in the Caballo Mountains and near the northwest corner of the SW1/4SE1/4 of sec. 26, T. 15 S., R. 3 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) very stony loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many very fine interstitial pores; about 10 percent stones, 20 percent gravel, and 15 percent cobbles; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

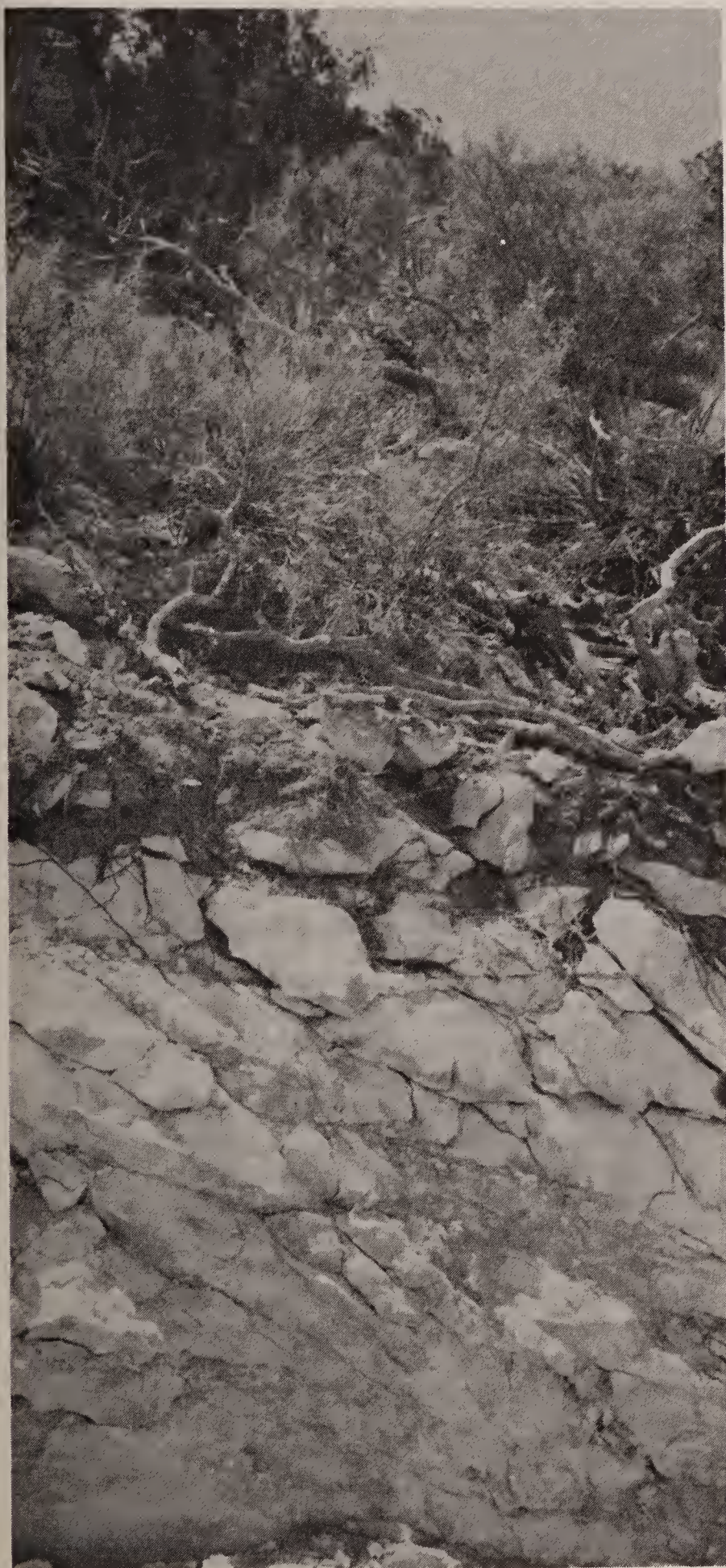
C1—4 to 10 inches; brown (10YR 5/3) very stony loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many very fine interstitial pores; about 10 percent stones, 25 percent gravel, and 10 percent cobbles; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; clear wavy boundary.

C2ca—10 to 13 inches; pale brown (10YR 6/3) very stony loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; about 15 percent stones, 20 percent gravel, and 10 percent cobbles; violently effervescent; calcium carbonate disseminated and as coatings on coarse fragments; moderately alkaline; abrupt wavy boundary.

R—13 inches; limestone; patchy coatings of caliche on surface.

Depth to limestone is 6 to 20 inches. Limestone and caliche fragments make up 35 to 85 percent of the





**Figure 16—Profile of Deama very stony loam in an area of Rock outcrop-Deama association, extremely steep.**

control section. The calcium carbonate equivalent ranges

from 40 to 60 percent in the control section. The profile is mildly alkaline or moderately alkaline. The C horizon is brown or light brown in the upper part. It is very stony loam or very gravelly loam. The very gravelly loam is 1 to 10 percent stones. The R horizon is commonly coated with caliche. Cracks and fractures that are filled with caliche are in the upper part in some pedons.

### **Delnorte Series**

The soils in the Delnorte series are classified as Typic Paleorthids, loamy-skeletal, mixed, thermic, shallow. These shallow, well drained soils formed in gravelly mixed alluvium. They are on piedmonts. Slope is 1 to 15 percent. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Delnorte very gravelly fine sandy loam in an area of Delnorte-Cave-Tencee complex, moderately rolling, about 12 miles southeast of Truth or Consequences, near the center of the NE1/4SE1/4 of sec. 23, T. 15 S., R. 3 W.

A11—0 to 4 inches; light yellowish brown (10YR 6/4) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; about 50 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

A12—4 to 10 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial pores; about 40 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin coatings on coarse fragments; moderately alkaline; clear wavy boundary.

C1ca—10 to 14 inches; very pale brown (10YR 7/4) very gravelly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; about 60 percent mixed gravel; violently effervescent; calcium carbonate disseminated and as gravel-sized caliche fragments; moderately alkaline; abrupt wavy boundary.

C2cam—14 to 26 inches; extremely hard, cemented and laminated caliche; clear smooth boundary.

C3cam—26 to 60 inches; cemented nodules of caliche and gravel that can be broken apart with a shovel.

Depth to the petrocalcic horizon ranges from 6 to 20 inches. Thickness of the petrocalcic horizon is 6 to 24



inches. Content of coarse fragments in the control section is 35 to 75 percent.

The A horizon is light yellowish brown or pale brown. The Cca horizon is yellowish brown or very pale brown. The Ccam horizon is extremely hard cemented caliche and gravel.

## Dona Ana Series

The soils in the Dona Ana series are classified as Typic Haplargids, fine-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 9 percent. Elevation is 4,050 to 5,500 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Dona Ana very fine sandy loam in an area of Dona Ana-Tres Hermanos association, gently sloping, about 20 miles east of Arrey, in the southeast corner of the SE1/4NW1/4 of sec. 20, T. 17 S., R. 1 W.

A1—0 to 3 inches; light brown (7.5YR 6/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine vesicular pores and common very fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21t—3 to 12 inches; light brown (7.5YR 6/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; thin clay films coating sand grains and lining pores; common very fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B22tca—12 to 18 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; thin clay films coating some sand grains; common very fine interstitial pores; strongly effervescent; calcium carbonate disseminated and as common fine soft masses; moderately alkaline; clear smooth boundary.

C1ca—18 to 29 inches; pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; massive; hard, friable, common fine interstitial pores; violently effervescent; calcium carbonate disseminated and as many medium soft masses; moderately alkaline; clear smooth boundary.

C2—29 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; slightly hard, very friable, slightly sticky and nonplastic; common fine interstitial pores; strongly effervescent; moderately alkaline.

From 10 to 30 percent of the surface is covered with gravel. The depth to the calcic horizon ranges from 14 to 30 inches. In some pedons the control section is as much as 15 percent gravel.

The A1 horizon is light reddish brown, reddish brown, brown, light brown, or reddish yellow fine sandy loam, sandy loam, very fine sandy loam, or loamy fine sand. Content of coarse fragments is 0 to 25 percent, most of which are on the surface. The horizon is mildly alkaline or moderately alkaline. The Bt horizon is brown, light brown, reddish brown, pink, or reddish yellow clay loam, sandy clay loam, or heavy sandy loam. The Cca horizon is light brown, light reddish brown, pink, or pinkish white sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam. This horizon is weakly cemented with caliche that becomes soft when moist.

## Eba Series

The soils in the Eba series are classified as Typic Haplargids, clayey-skeletal, mixed, thermic. These deep, well drained soils formed in gravelly mixed alluvium. They are on piedmonts. Slope is 1 to 7 percent. Elevation is 4,100 to 5,700 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Eba very gravelly loam, gently sloping, about 18 miles north of Truth or Consequences, near the southeast corner of the SW1/4 of sec. 36, T. 10 S., R. 4 W.

A1—0 to 3 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common fine interstitial pores; about 45 percent igneous gravel; mildly alkaline; abrupt smooth boundary.

B2t—3 to 21 inches; reddish brown (5YR 5/4) very gravelly heavy clay loam, yellowish red (5YR 5/6) moist; hard, firm, sticky and plastic; common very fine roots; common very fine interstitial pores; common thin clay films on faces of peds, coating coarse fragments, and bridging some sand grains; 40 percent igneous gravel; mildly alkaline; clear smooth boundary.

C1ca—21 to 29 inches; pink (7.5YR 7/4) very gravelly heavy clay loam, light brown (7.5YR 6/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common very fine interstitial pores; 45 percent igneous gravel; violently effervescent; common medium soft masses of calcium carbonate and weakly cemented caliche and gravel; moderately alkaline; gradual smooth boundary.

C2ca—29 to 60 inches; light brown (7.5YR 6/4) very gravelly clay loam, brown (7.5YR 5/4) moist;



massive; hard, friable, sticky and plastic; 45 percent igneous gravel; violently effervescent; thin calcium carbonate coatings on coarse fragments and common medium soft masses of calcium carbonate disseminated throughout; moderately alkaline.

Thickness of the solum ranges from 20 to 48 inches. The A horizon and upper part of the B horizon commonly are noneffervescent but are slightly effervescent throughout in some pedons. Coarse fragments in the control section range from 35 to 60 percent.

## Elbutte Series

The soils in the Elbutte series are classified as Typic Torriorthents, clayey, mixed (calcareous), shallow. These shallow, well drained soils formed in material derived dominantly from shale. They are on nearly level to rolling side slopes. Slope is 1 to 15 percent. Elevation is 4,400 to 5,500 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 170 to 210 days.

Typical pedon of Elbutte gravelly clay loam in an area of Elbutte-Courthouse complex, moderately rolling, about 8 miles southeast of Truth or Consequences; about 300 feet east of the high power line and 30 feet north of the road, near the southeast corner of the SW1/4NE1/4 of sec. 28, T. 14 S., R. 3 W.

- A1—0 to 3 inches; light yellowish brown (2.5Y 6/4) gravelly clay loam, olive brown (2.5Y 4/4) moist; weak medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; 18 percent sandstone gravel; mildly alkaline; clear smooth boundary.
- B1—3 to 7 inches; light olive brown (2.5YR 5/4) clay loam, olive brown (2.5YR 4/4) moist; moderate very fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores; mildly alkaline; clear smooth boundary.
- B2—7 to 10 inches; light olive brown (2.5YR 5/4) clay loam, olive brown (2.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common very fine interstitial pores; few shale fragments; slightly effervescent; evenly disseminated calcium carbonate; moderately alkaline; abrupt wavy boundary.
- C1—10 to 14 inches; light olive brown (2.5Y 5/4) extremely shaly silty clay loam, olive brown (2.5Y 4/4) moist; weak very fine subangular blocky structure; hard, friable, sticky and plastic; few fine roots; about 75 percent shale fragments; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

R—14 to 30 inches; very hard light olive brown (2.5Y 5/4) shale that can be dug with difficulty; common thin strata of interbedded sandstone.

Scattered stones cover 1 to 5 percent of the surface. The solum is less than 10 inches thick. Depth to shale and interbedded sandstone is 4 to 20 inches. The B horizon is clay or clay loam and is 35 to 60 percent clay. It is 5 to 15 percent shale and sandstone fragments. The C horizon is silty clay loam or clay loam and is 60 to 90 percent shale and sandstone fragments.

## Gila Series

The soils in the Gila series are classified as Typic Torrifluvents, coarse-loamy, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 3 percent. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 68 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Gila very fine sandy loam in an area of Glendale-Gila complex, nearly level, about 3 miles southwest of Truth or Consequences, near the center of sec. 17, T. 14 S., R. 4 W.

- A1—0 to 8 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; weak fine platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- C1—8 to 20 inches; pale brown (10YR 6/3) stratified silt loam, loam, and very fine sandy loam that average loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- C2—20 to 60 inches; pale brown (10YR 6/3) stratified fine sandy loam, loam, and very fine sandy loam that average very fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Sandy or clayey layers less than 2 inches thick are throughout the profile in some pedons.

## Glendale Series

The soils in the Glendale series are classified as Typic Torrifluvents, fine-silty, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium.



They are on flood plains. Slope is 0 to 3 percent. Elevation is 4,050 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 68 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Glendale silty clay loam in an area of Glendale-Gila complex, nearly level, about 12 miles north of Truth or Consequences, in the northwest corner of the NE1/4NW1/4 of sec. 31, T. 11 S., R. 4 E.

A1—0 to 3 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium platy structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—3 to 36 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; weak medium platy structure; hard, very friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—36 to 48 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial pores; strongly effervescent; calcium carbonate disseminated and in few fine soft masses; moderately alkaline; clear smooth boundary.

C3—48 to 60 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Calcium carbonate content in the control section ranges from a trace to 8 percent. The profile is nonsaline to moderately saline.

The A horizon is very pale brown, brown, or grayish brown silty clay loam, clay loam, or loam. The C horizon is 0 to 5 percent gravel. It is stratified silt loam, clay loam, silty clay loam, and fine sandy loam.

## Goldust Series

The soils in the Goldust series are Aridic Argiustolls, clayey-skeletal, mixed, mesic. These deep, well drained soils formed in mixed alluvium. They are on dissected piedmonts. Slope is 5 to 55 percent. Elevation is 5,200 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 50 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Goldust very gravelly clay loam, very steep, about 6 miles north and 5 miles west of the Ladder Ranch headquarters, about 1,750 feet north and 240 feet west of the northeast corner of sec. 6, T. 14 S., R. 7 W.

A1—0 to 8 inches; dark gray (10YR 4/1) very gravelly clay loam, black (10YR 2/1) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine interstitial pores and few very fine tubular pores; about 55 percent gravel and cobbles; neutral; clear smooth boundary.

B21t—8 to 19 inches; brown (7.5YR 4/2) gravelly clay, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; very hard, firm, very sticky and very plastic; common very fine roots; common very fine interstitial pores; about 30 percent gravel and cobbles; common moderately thick clay films on faces of peds; neutral; clear wavy boundary.

B22t—19 to 32 inches; brown (7.5YR 5/4) very gravelly clay, dark brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; very hard, firm, very sticky and plastic; few very fine roots; common very fine interstitial pores; about 45 percent gravel and cobbles; common thin clay films on faces of peds and between mineral grains; mildly alkaline; clear wavy boundary.

C1ca—32 to 40 inches; pink (7.5YR 7/4) very gravelly sandy clay loam, brown (7.5YR 5/4) moist; massive; very hard, firm, sticky and plastic; few very fine roots; many very fine and fine interstitial pores; about 45 percent gravel and cobbles; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—40 to 60 inches; pinkish gray (7.5YR 7/2) very gravelly sandy clay loam, brown (7.5YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine and few fine interstitial pores; about 60 percent gravel and cobbles; moderately alkaline.

The solum ranges from 15 to 40 inches in thickness.

The A horizon is dark gray, brown, or dark grayish brown very gravelly clay loam, gravelly clay loam, or gravelly sandy clay loam and is 1 to 10 percent cobbles. The Bt horizon is dark brown or brown very gravelly clay loam, very gravelly clay, very gravelly sandy clay, or gravelly clay. It is 35 to 60 percent rock fragments, of which 1 to 10 percent is cobbles. The C horizon is brown, light brown, pinkish gray, or pink very gravelly sandy clay loam or very gravelly clay containing 5 to 15 percent calcium carbonate equivalent.



## Hap Series

The soils in the Hap series are classified as Typic Haplargids, fine-loamy, mixed, thermic. These deep, well drained soils formed in gravelly mixed alluvium. They are on piedmonts. Slope is 1 to 7 percent. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Hap very gravelly loam in an area of Tres Hermanos-Hap association, gently sloping, about 25 miles southwest of Truth or Consequences; about 500 feet north and 500 feet west of the southeast corner of the NW1/4 of sec. 16, T. 16 S., R. 6 W.

A11—0 to 2 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak fine platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; many fine vesicular pores and many very fine interstitial pores; about 40 percent of the surface is covered with igneous gravel; neutral; abrupt smooth boundary.

A12—2 to 5 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine interstitial pores and few very fine tubular pores; about 30 percent gravel and 5 percent cobbles; neutral; clear smooth boundary.

B21t—5 to 11 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) moist; strong fine angular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; 35 percent igneous gravel; common thin clay films coating coarse fragments and bridging sand grains; neutral; clear wavy boundary.

B22t—11 to 20 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; strong fine prismatic structure parting to strong fine angular blocky; hard, friable, sticky and plastic; few fine roots; few very fine tubular pores; 20 percent igneous gravel and 10 percent cobbles; many thick clay films on faces of peds, coating coarse fragments, and bridging sand grains; mildly alkaline; clear wavy boundary.

B3tca—20 to 24 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; strong fine angular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; few fine interstitial and tubular pores; 25 percent igneous gravel and 5 percent cobbles; common moderately thick clay films on faces of peds, coating coarse fragments, and bridging sand grains; strongly effervescent; common soft masses of calcium carbonate; mildly alkaline; clear wavy boundary.

C1ca—24 to 30 inches; pink (7.5YR 8/4) very gravelly sandy clay loam, pink (7.5YR 7/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; 35 percent igneous gravel and 10 percent cobbles; violently effervescent; disseminated calcium carbonate, coatings of calcium carbonate on coarse fragments, and weakly cemented calcium carbonate in places; moderately alkaline; clear wavy boundary.

C2ca—30 to 60 inches; pink (7.5YR 7/4) very cobbly sandy clay loam, light brown (7.5YR 6/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; 30 percent igneous gravel and 20 percent cobbles; violently effervescent; calcium carbonate disseminated and coating coarse fragments; moderately alkaline.

The solum ranges from 20 to 40 inches in thickness. The control section averages 28 to 35 percent clay.

The A horizon is reddish brown or light brown. The B horizon averages 15 to 35 percent gravel and cobbles. The Cca horizon has 15 to 40 percent calcium carbonate equivalent in the upper part.

## Harkey Series

The soils in the Harkey series are classified as Typic Torrifluvents, coarse-silty, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 1 percent. Elevation is 4,100 to 4,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Harkey clay loam, about 15 miles south of Truth or Consequences, 1,350 feet east and 300 feet north of the southwest corner of sec. 12, T. 17 S., R. 5 W., about 50 feet west of the irrigation lateral.

Ap1—0 to 12 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many fine tubular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Ap2—12 to 15 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; many fine tubular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C1—15 to 18 inches; light brownish gray (10YR 6/2) silt loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine tubular and vesicular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.



- C2—18 to 26 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular and interstitial pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.
- C3—26 to 35 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; common medium distinct mottles; very hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular and vesicular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.
- C4—35 to 46 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; common medium faint mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular and vesicular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.
- C5—46 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; soft, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular and interstitial pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline.

The profile is mildly alkaline to strongly alkaline and slightly saline to strongly saline. A fluctuating water table commonly is below a depth of 60 inches, but is at a depth of about 48 to 60 inches in some pedons.

The A horizon is pale brown, grayish brown, or brown loam, clay loam, or fine sandy loam. The C horizon is highly stratified silt loam, loam, or fine sandy loam and is less than 18 percent clay.

## Holloman Series

The soils in the Holloman series are classified as Typic Torriorthents, loamy, gypsic, thermic, shallow. These shallow, well drained soils formed in alluvium and residuum derived dominantly from gypsum. They are on basin floors. Slope is 0 to 5 percent. Elevation is 4,700 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Holloman fine sandy loam, moderately undulating, about 16 miles northeast of Engle, near the southeast corner of the NW1/4SW1/4NE1/4 of sec. 36, T. 10 S., R. 1 W.

- A1—0 to 2 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine vesicular pores; about 45 percent gypsum; slightly effervescent;

disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

- C1cs—2 to 5 inches; pink (7.5YR 7/4) fine sandy loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common medium and fine roots; common fine interstitial pores and few fine tubular pores; about 75 percent fine gypsum crystals; mildly alkaline; clear smooth boundary.
- C2cs—5 to 12 inches; pink (7.5YR 7/4) very fine sandy loam, yellowish red (5YR 5/6) moist; massive; hard, friable, nonsticky and nonplastic; common medium and fine roots; common very fine interstitial pores and few fine tubular pores; about 65 percent fine gypsum crystals; moderately alkaline; clear smooth boundary.
- C3rcacs—12 to 26 inches; pink (7.5YR 7/4) gypsum, reddish yellow (7.5YR 6/6) moist; massive; very hard, firm, nonsticky and nonplastic; few very fine tubular and interstitial pores; about 85 percent fine gypsum crystals; weakly cemented; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- C4rcacs—26 to 42 inches; pink (7.5YR 8/4) gypsum, light brown (7.5YR 6/4) moist; massive; extremely hard, very firm, nonsticky and nonplastic; few very fine tubular and interstitial pores; about 85 percent weakly cemented gypsum; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- C5rcacs—42 to 60 inches; white (10YR 8/2) gypsum, very pale brown (10YR 7/3) moist; massive; hard, friable, nonsticky and nonplastic; few very fine tubular and interstitial pores; about 75 percent fine gypsum crystals; strongly effervescent; disseminated calcium carbonate, moderately alkaline.

Depth to very hard gypsum is 4 to 20 inches. The profile is neutral to moderately alkaline and is nonsaline to moderately saline. Content of gypsum is 40 percent in the A horizon to 80 percent or more in the C horizon. Content of gypsum in the control section is more than 40 percent. The C horizon is pink or white fine sandy loam or very fine sandy loam in the upper part and is nearly pure gypsum in the lower part.

## Holloman Variant

The soils in the Holloman Variant are classified as Typic Torriorthents, fine-loamy, gypsic, thermic, shallow. These shallow and very shallow, moderately well drained soils formed in alluvium and residuum derived dominantly from gypsum. They are on basin floors. Slope is 0 to 5 percent. Elevation is 4,700 to 4,900 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free season is 180 to 220 days.



Typical pedon of Holloman Variant clay loam, moderately undulating, about 16 miles north of Engle, near the southwest corner of the NE1/4 of sec. 36, T. 10 S., R. 1 W.

- A11—0 to 0.5 inch; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; hard, very friable, sticky and plastic; few fine roots; common fine vesicular and interstitial pores; common fine salt crystals; mildly alkaline; abrupt smooth boundary.
- A12—0.5 to 1 inch; dark brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, very friable, sticky and plastic; few fine roots; common fine interstitial pores; common fine salt crystals; moderately alkaline; abrupt wavy boundary.
- A13—1 to 3 inches; dark brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few medium and fine roots; common fine tubular and interstitial pores; common fine salt and gypsum crystals; mildly alkaline; abrupt smooth boundary.
- B2—3 to 8 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine interstitial pores; about 50 percent fine gypsum crystals; mildly alkaline; clear smooth boundary.
- C1cs—8 to 13 inches; white (10YR 8/2) very fine sandy loam, pale brown (10YR 7/3) moist; massive; hard, brittle, nonsticky; about 80 percent gypsum; mildly alkaline; clear smooth boundary.
- C2rcs—13 to 32 inches; white (10YR 8/2) gypsum; hard; about 90 percent fine gypsum crystals; neutral; clear smooth boundary.
- C3rcs—32 to 40 inches; white (10YR 8/2) gypsum; hard and brittle; about 90 percent fine gypsum crystals; clear smooth boundary.
- C4rcs—40 to 64 inches; white (10YR 8/1) gypsum; very hard, brittle; water table at a depth of 60 inches.

Depth to gypsum is 4 to 20 inches. The profile is moderately alkaline or strongly alkaline. The solum is moderately saline or strongly saline and is moderately alkali-affected or strongly alkali-affected. Content of gypsum in the control section is 40 to 80 percent. A water table is at a depth of 48 to 96 inches.

## Ildefonso Series

The soils in the Ildefonso series are classified as Ustollic Calciorthids, loamy-skeletal, mixed, mesic. These deep, well drained soils formed in mixed alluvium. They are on dissected piedmonts. Slope is 1 to 75 percent. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air

temperature is 54 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Ildefonso gravelly loam in an area of Scholle-Ildefonso association, moderately rolling, about 2 miles southeast of Lake Valley, 500 feet north of the southwest corner of the SE1/4 of sec. 35, T. 18 S., R. 7 W.

- A1—0 to 4 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine vesicular pores and common very fine interstitial pores; about 50 percent of the surface is covered with igneous gravel; 30 percent igneous gravel in the horizon; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- B2—4 to 14 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; common fine roots; few fine tubular pores and common very fine interstitial pores; about 30 percent igneous gravel and a few cobbles; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- C1ca—14 to 20 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; hard, very friable, slightly sticky and nonplastic; few fine roots; common very fine interstitial pores; about 30 percent igneous gravel and 5 percent cobbles; strongly effervescent; calcium carbonate disseminated and as thin coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- C2ca—20 to 27 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; massive; hard, very friable, slightly sticky and nonplastic; few fine roots; common very fine interstitial pores; about 40 percent caliche and igneous gravel and 5 percent cobbles; violently effervescent; calcium carbonate disseminated and as thin coatings on coarse fragments; many medium caliche fragments; moderately alkaline; clear wavy boundary.
- C3ca—27 to 60 inches; pink (7.5YR 8/4) very gravelly loam, brown (7.5YR 5/4) moist; massive; very hard, firm, nonsticky and nonplastic; few fine interstitial pores; about 35 percent caliche and igneous gravel and 5 percent cobbles; violently effervescent; coatings of calcium carbonate on coarse fragments and as weakly cemented calcium carbonate that softens when moist; moderately alkaline.



The profile is mildly alkaline or moderately alkaline. The control section averages 35 to 60 percent coarse fragments.

The A and B horizons are light brown or brown gravelly loam, very gravelly loam, or very gravelly sandy loam.

### La Fonda Series

The soils in the La Fonda series are classified as Ustollic Camborthids, fine-loamy, mixed, mesic. These deep, well drained soils formed in mixed alluvium. They are on flood plains and low terraces. Slope is 0 to 5 percent. Elevation is 5,800 to 6,700 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 53 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of La Fonda loam, gently sloping, about 4 miles east of Winston, in the SW1/4NW1/4NW1/4 of sec. 16, T. 11 S., R. 7 W., in a gully on the south side of the road.

- A1—0 to 4 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few fine vesicular pores and common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- B1—4 to 12 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; common very fine interstitial pores and few fine tubular pores; strongly effervescent; calcium carbonate disseminated and as common fine filaments; moderately alkaline; clear smooth boundary.
- B22—12 to 23 inches; brown (7.5YR 5/4) clay loam, brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; common very fine interstitial pores and few fine tubular pores; strongly effervescent; calcium carbonate disseminated and as common fine filaments; moderately alkaline; clear smooth boundary.
- B3—23 to 40 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common very fine interstitial pores and few fine tubular pores; strongly effervescent; calcium carbonate disseminated and as common fine filaments; moderately alkaline; abrupt smooth boundary.
- C1—40 to 60 inches; reddish brown (2.5YR 5/4) silty clay loam, dark reddish brown (2.5YR 3/4) moist; massive; hard, friable, sticky and plastic; few fine roots; common very fine interstitial pores and few fine tubular pores; strongly effervescent;

disseminated calcium carbonate; moderately alkaline.

The solum ranges from 18 to 40 inches in thickness. The profile is mildly alkaline or moderately alkaline. Some pedons have as much as 15 percent gravel in the profile. The B horizon is clay loam or silty clay loam. The C horizon is silty clay loam or loam.

### Largo Series

The soils in the Largo series are classified as Typic Torriorthents, fine-silty, mixed (calcareous), thermic. These deep, well drained soils formed in mixed alluvium. They are in swales on flood plains. Slope is 1 to 5 percent. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Largo silt loam in an area of Largo-Sotim association, gently sloping, about 5 miles southwest of Upham railroad siding, near the southeast corner of the NW1/4NE1/4 of sec. 16, T. 17 S., R. 2 W.

- A1—0 to 4 inches; light reddish brown (5YR 6/4) silt loam, reddish brown (5YR 4/4) moist; moderate fine platy structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; strongly effervescent; mildly alkaline; clear smooth boundary.
- C1—4 to 11 inches; reddish brown (5YR 5/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak coarse subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores; strongly effervescent; moderately alkaline; clear smooth boundary.
- C2—11 to 18 inches; reddish brown (5YR 5/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak coarse subangular blocky structure; very hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores and few fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.
- C3—18 to 38 inches; reddish brown (5YR 5/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; common very fine interstitial pores; strongly effervescent; moderately alkaline; clear smooth boundary.
- C4—38 to 60 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; massive; very hard, firm, very sticky and plastic; common very fine interstitial pores; strongly effervescent; few faint carbonate filaments in seams; moderately alkaline.



The A horizon is light reddish brown or reddish brown silt loam or very fine sandy loam. The C horizon is silty clay loam or silt loam. Some pedons have thin strata of gravelly sandy loam in the lower part.

## Lehmans Series

The soils in the Lehmans series are classified as Lithic Haplargids, clayey, montmorillonitic, thermic. These shallow, well drained soils formed in material derived dominantly from acid igneous rock. They are on the more nearly south-facing side slopes of hills and low mountains. Slope is 5 to 55 percent. Elevation is 4,200 to 6,400 feet. The average annual precipitation is 8 to 13 inches, the average annual air temperature is about 58 to 62 degrees F, and the frost-free period is 170 to 190 days.

Typical pedon of Lehmans very stony clay loam in an area of Lehmans-Luzena association, very steep, about 12 miles southeast of Lake Valley, near the southeast corner of the NE1/4NW1/4 of sec. 36, T. 19 S., R. 6 W.

A1—0 to 3 inches; brown (10YR 5/3) very stony clay loam, dark brown (7.5YR 3/4) moist; common fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common very fine interstitial pores; about 25 percent acid igneous cobbles and stones and 30 percent gravel; mildly alkaline; clear smooth boundary.

B21t—3 to 8 inches; reddish brown (5YR 4/4) stony clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots; common very fine interstitial pores; about 20 percent mixed igneous cobbles and stones and 10 percent gravel; few thin clay films coating coarse fragments and bridging sand grains; mildly alkaline; clear smooth boundary.

B22t—8 to 12 inches; brown (7.5YR 4/4) stony clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores; about 20 percent mixed igneous cobbles and stones and 10 percent gravel; few thin clay films coating coarse fragments and bridging sand grains; strongly effervescent in the lower part; mildly alkaline; abrupt wavy boundary.

R—12 inches; acid andesite; thin patchy caliche coatings on the surface.

The thickness of the solum and depth to bedrock range from 7 to 20 inches. The profile is neutral or mildly alkaline. Content of clay in the control section ranges from 35 to 50 percent.

## Lithic Haplargids

Lithic Haplargids are shallow, well drained soils that formed in residuum and eolian sediment derived mainly from sandstone. They are on piedmont slopes. Slope is 1 to 15 percent. Elevation is 4,700 to 5,100 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 57 to 65 degrees F, and the frost-free period is 180 to 220 days.

Sample pedon of Lithic Haplargids, moderately sloping, in an area about 8 miles north and 3 miles west of Engle, 0.1 mile west of the center of the NW1/4 of sec. 20, T. 12 S., R. 2 W.

A1—0 to 3 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure parting to strong fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common thin clay films coating and bridging sand grains; moderately alkaline; clear wavy boundary.

B2t—3 to 9 inches; strong brown (7.5YR 4/6) sandy clay loam, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure parting to strong fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common thin clay films coating and bridging sand grains; moderately alkaline; clear wavy boundary.

C1ca—9 to 12 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many fine and very fine interstitial pores; 35 percent gravel; very few thin clay films coating and bridging sand grains; strongly effervescent; calcium carbonate disseminated and as common medium soft masses; moderately alkaline; abrupt wavy boundary.

Cr—12 to 15 inches; weathered sandstone; abrupt wavy boundary.

R—15 inches; sandstone.

These soils are extremely variable in their characteristics. Depth to bedrock ranges from 4 to 20 inches. The clay content of the profile ranges from 10 to 45 percent. The content of rock fragments ranges from 5 to 60 percent.

## Lozier Series

The soils in the Lozier series are classified as Lithic Calciorthids, loamy-skeletal, carbonatic, thermic. These shallow, well drained soils formed in material derived dominantly from limestone. They are on limestone hills and low mountains. Slope is 5 to 25 percent. Elevation is 4,100 to 6,000 feet. The average annual precipitation is



about 8 to 11 inches. The average annual air temperature is 57 to 65 degrees F, and the frost-free period is 170 to 220 days.

Typical pedon of Lozier very stony loam in an area of Lozier-Rock outcrop association, hilly, about 10 miles east of Derry, near the northwest corner of the NE1/4 of sec. 35, T. 17 N., R. 3 W.

A1—0 to 2 inches; light brown (7.5YR 6/4) very stony loam, brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and slightly plastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; 60 percent coarse fragments; strongly effervescent; calcium carbonate disseminated throughout and segregated as coatings on coarse fragments; moderately alkaline; clear smooth boundary.

C1—2 to 6 inches; light brown (7.5YR 6/4) very stony loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common fine roots; common very fine interstitial pores; 40 percent coarse fragments; strongly effervescent; calcium carbonate disseminated throughout and segregated as coatings on coarse fragments; moderately alkaline; clear wavy boundary.

C2ca—6 to 9 inches; pink (7.5YR 7/4) very stony loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine roots; common very fine interstitial pores; 40 percent coarse fragments; violently effervescent; calcium carbonate disseminated and segregated as coatings on coarse fragments and as common hard caliche fragments; moderately alkaline; abrupt wavy boundary.

R—9 inches; limestone; surface coated with caliche.

Depth to bedrock is 4 to 20 inches. The profile is about 35 to 70 percent stones, cobbles, and gravel.

## Luzena Series

The soils in the Luzena series are classified as Lithic Argiustolls, clayey, montmorillonitic, mesic. These shallow, well drained soils formed in material derived dominantly from acid igneous rock. They are on hills and low mountains. Slope is 5 to 55 percent. Elevation is 5,000 to 7,800 feet. The average annual precipitation is 11 to 15 inches. The average annual air temperature is 53 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Luzena gravelly loam in an area of Luzena-Rock outcrop association, very steep, about 1 mile east of Lake Valley, near the northwest corner of the SW1/4 of sec. 27, T. 18 S., R. 7 W.

A1—0 to 2 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine

granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; about 25 percent acid igneous gravel and 5 percent cobbles; neutral; clear smooth boundary.

B1—2 to 5 inches; brown (7.5YR 5/2) gravelly clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; common very fine interstitial pores; 20 percent acid igneous gravel and 5 percent cobbles and stones; neutral; clear smooth boundary.

B21t—5 to 9 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores; 15 percent acid igneous gravel and 5 percent cobbles and stones; common thin clay films on faces of peds, coating coarse fragments, and bridging sand grains; neutral; clear smooth boundary.

B22t—9 to 14 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores; 25 percent acid igneous gravel and 5 percent cobbles and stones; common thin clay films on faces of peds, coating coarse fragments, and bridging sand grains; thin patchy carbonate coatings on undersides of some coarse fragments; mildly alkaline; abrupt wavy boundary.

R—14 inches; rhyolite; upper 3 inches is partially weathered.

Thickness of the solum and depth to bedrock range from 7 to 20 inches. The lower part of the solum in some pedons is effervescent and is less than 15 percent calcium carbonate equivalent. The profile is 15 to 35 percent stones, gravel, and cobbles.

The A horizon is gravelly loam, gravelly clay loam, or cobbly loam and has scattered stones on the surface. The B horizon is brown, dark brown, or reddish brown gravelly heavy clay loam, gravelly clay, or cobbly heavy clay loam and is 35 to 50 percent clay. The upper part of the R horizon commonly is fractured.

## Manzano Series

The soils in the Manzano series are classified as Cumulic Haplustolls, fine-loamy, mixed, mesic. These deep, well drained soils formed in mixed alluvium. They are on flood plains and alluvial fans. Slope is 0 to 5 percent. Elevation is 5,800 to 6,500 feet. The average annual precipitation is 11 to 13 inches. The average annual temperature is 53 to 58 degrees F, and the frost-free period is 140 to 180 days.



Typical pedon of Manzano loam in an area of Manzano loams, gently sloping, about 30 miles east of Truth or Consequences, near the center of the NW1/4 of sec. 28, T. 12 S., R. 2 E.

A1—0 to 10 inches; brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; weak fine platy structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; few fine tubular pores and common very fine interstitial pores; strongly effervescent; calcium carbonate disseminated and as a few thin seams and filaments; mildly alkaline; clear smooth boundary.

C1—10 to 42 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak subangular blocky; hard, friable, sticky and slightly plastic; common fine roots; few fine tubular pores and common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—42 to 60 inches; pale brown (10YR 6/3) silty clay loam with thin strata of gravelly material, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; common fine tubular pores and common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Thin strata that are 1 to 15 percent gravel are below a depth of 20 inches in some pedons. The A horizon is loam, silt loam, or clay loam.

## Marconi Series

The soils in the Marconi series are classified as Typic Camborthids, fine, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains, in swales, and on basin floors. Slope is 0 to 3 percent. Elevation is 4,100 to 4,700 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Marconi silty clay loam, 0 to 3 percent slopes, about 4 miles south of the Upham railroad siding, near the center of the SW1/4 of sec. 14, T. 17 S., R. 2 W.

A1—0 to 4 inches; reddish brown (2.5YR 5/4) silty clay loam, dark reddish brown (2.5YR 3/4) moist; weak medium platy structure; hard, friable, sticky and plastic; few fine roots; common fine vesicular pores and common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21—4 to 16 inches; reddish brown (2.5YR 5/4) clay, dark reddish brown (2.5YR 3/4) moist; weak medium subangular blocky and prismatic structure; very hard, firm, very sticky and plastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; gradual smooth boundary.

B22—16 to 41 inches; reddish brown (2.5YR 5/4) clay, dark reddish brown (2.5YR 3/4) moist; weak medium subangular blocky structure; very hard, firm, very sticky and plastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—41 to 60 inches; reddish brown (2.5YR 5/4) heavy clay loam, dark reddish brown (2.5YR 3/4) moist; very hard, firm, sticky and plastic; common very fine interstitial pores; common very fine and fine gypsum crystals; strongly effervescent; moderately alkaline.

Thickness of the solum is 20 to 48 inches.

## Mimbres Series

The soils in the Mimbres series are classified as Typic Camborthids, fine-silty, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains, alluvial fans, terraces, and benches. Slope is 0 to 5 percent. Elevation is 4,050 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is about 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Mimbres silt loam, gently sloping, about 13 miles northeast of Engle, about 1,000 feet east and 1,000 feet north of the center of sec. 27, T. 12 S., R. 1 E.

A1—0 to 7 inches; light brown (7.5YR 6/4) silt loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

B2—7 to 26 inches; pinkish gray (7.5YR 6/2) silty clay loam, brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and common very fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1—26 to 52 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.



C2ca—52 to 60 inches; pink (7.5YR 7/4) silt loam, reddish yellow (7.5YR 6/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The reaction is mildly alkaline or moderately alkaline throughout the profile. Thin strata that have varying amounts of gravel are below a depth of 40 inches in some pedons. Some pedons in the northeastern part of the survey area have finely divided gypsum crystals in the lower part of the profile.

The A horizon is light brown or brown silt loam or clay loam. The B horizon is pinkish gray, pale brown, or brown silt loam or silty clay loam. The C horizon is brown, light brown, pale brown, or pink, stratified silt loam or silty clay loam.

### Minlith Series

The soils in the Minlith series are classified as Lithic Torriorthents, sandy-skeletal, mixed, thermic. These shallow, well drained soils formed in eolian and residual material derived from mixed sources. They are on basalt lava flows. Slope is 1 to 15 percent. Elevation is 4,500 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Minlith gravelly loamy fine sand in an area of Minlith-Rock outcrop association, moderately rolling, about 20 miles north of Engle, about 750 feet northeast of the center of sec. 15, T. 10 S., R. 1 E.

A1—0 to 2 inches; reddish brown (5YR 5/4) gravelly loamy fine sand, reddish brown (5YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few fine roots; many fine interstitial pores; 20 percent gravel and 7 percent cobbles; neutral; clear smooth boundary.

B2—2 to 8 inches; reddish brown (5YR 5/4) very gravelly loamy fine sand, reddish brown (5YR 4/4) moist; single grain and weak fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine roots; many fine interstitial pores; about 35 percent gravel and 10 percent cobbles; few carbonate coatings on coarse fragments; mildly alkaline; abrupt wavy boundary.

R—8 inches; fractured basalt; thin patchy caliche coatings on the surface.

Depth to basalt ranges from 4 to 20 inches.

The A horizon has a few stones scattered on the surface in some areas. The B horizon is 0 to 5 percent stones. A C horizon is present in pedons that are more than 10 inches deep to bedrock.

### Muzzler Series

The soils in the Muzzler series are classified as Lithic Argiustolls, clayey-skeletal, mixed, mesic. These shallow, well drained soils formed in mixed alluvium. They are on dissected piedmonts. Slope is 5 to 55 percent. Elevation is 5,150 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 50 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Muzzler very gravelly loam, hilly, in the southwest corner of the survey area, near the center of the NW1/4SE1/4 of sec. 36, T. 19 S., R. 8 W.

A1—0 to 2 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/2) moist; weak fine platy structure parting to weak fine granular; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores and common very fine interstitial pores; 45 percent igneous gravel and 15 percent cobbles; neutral; clear smooth boundary.

B21t—2 to 5 inches; brown (7.5YR 4/4) very gravelly heavy clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; common very fine interstitial pores; few thin clay films coating coarse fragments, lining pores, and bridging sand grains; 35 percent igneous gravel and 5 percent cobbles; neutral; clear smooth boundary.

B22t—5 to 9 inches; brown (7.5YR 4/4) gravelly clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; common very fine interstitial pores; common thin clay films on faces of peds, on coarse fragments, lining pores, and bridging sand grains; 20 percent igneous gravel and 5 percent cobbles; mildly alkaline; clear smooth boundary.

B3t—9 to 13 inches; brown (7.5YR 5/4) very gravelly clay, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; common very fine pores; few thin clay films coating pores and bridging sand grains; 35 percent igneous gravel and 10 percent cobbles; mildly alkaline; abrupt smooth boundary.

R—13 inches; noneffervescent silica-cemented conglomerate of the Gila Formation; rounded and semirounded igneous gravel and cobbles that are cemented.

Thickness of the solum ranges from 8 to 20 inches. Coarse fragments in the control section average 35 to 50 percent.

The A horizon is very gravelly loam or very gravelly sandy clay loam. The B horizon is very gravelly clay, very cobbly clay, or very cobbly clay loam.



## Nickel Series

The soils in the Nickel series are classified as Typic Calciorthids, loamy-skeletal, mixed, thermic. These deep, well drained soils formed in gravelly mixed alluvium (fig. 17). They are on piedmonts. Slope is 1 to 65 percent. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Nickel very gravelly fine sandy loam in an area of Nickel-Chamberino association, gently sloping, about 10 miles south of Truth or Consequences, near the southwest corner of sec. 13, T. 15 S., R. 5 W.

A1—0 to 4 inches; light brown (7.5YR 6/4) very gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak fine



Figure 17.—Profile of Nickel very gravelly fine sandy loam in an area of Nickel-Chamberino association, gently sloping. Weakly cemented caliche is below a depth of 12 inches in some areas.

platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common fine interstitial pores; 50 percent gravel; slightly effervescent; calcium carbonate disseminated and as a few hard caliche concretions; moderately alkaline; clear smooth boundary.

C1—4 to 12 inches; light brown (7.5YR 6/4) very gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial pores; 40 percent gravel and 10 percent cobbles; strongly effervescent; calcium carbonate disseminated and as few medium concretions and thin coatings on coarse fragments; moderately alkaline; clear smooth boundary.

C2ca—12 to 24 inches; pink (7.5YR 7/4) very gravelly fine sandy loam, brown (7.5YR 5/4) moist; massive; hard, firm, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 40 percent gravel and 10 percent cobbles; violently effervescent; calcium carbonate disseminated and as few medium concretions and nearly continuous coatings on coarse fragments; moderately alkaline; clear wavy boundary.

C3ca—24 to 60 inches; light brown (7.5YR 6/4) extremely gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many fine interstitial pores; 65 percent gravel and cobbles; violently effervescent; calcium carbonate disseminated and as few fine concretions and thin patchy coatings on coarse fragments; moderately alkaline.

Depth to the calcic horizon is less than 20 inches. Gravel and cobbles make up 50 to 80 percent of the control section.

The A horizon is brown, light brown, or pale brown very gravelly fine sandy loam. The C1 horizon is light brown, brown, or yellowish brown. The Cca horizon is white, pink, very pale brown, or light brown very gravelly fine sandy loam, very gravelly sandy loam, or extremely gravelly sandy loam. It is weakly cemented in some pedons.

## Nolam Series

The soils in the Nolam series are classified as Ustollic Haplargids, loamy-skeletal, mixed, thermic. These deep, well drained soils formed in gravelly mixed alluvium. They are on piedmonts, high valley terraces, and alluvial fans. Slope is 1 to 7 percent. Elevation is 4,300 to 5,700 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Nolam very gravelly loam in an area of Pinaleno-Nolam association, moderately sloping,



about 22 miles north of Truth or Consequences, near the center of the NE1/4NW1/4 of sec. 9, T. 10 S., R. 4 W.

A1—0 to 2 inches; reddish brown (5YR 5/4) very gravelly loam, dark reddish brown (5YR 3/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores and very fine interstitial pores; about 55 percent gravel; mildly alkaline; clear smooth boundary.

B21t—2 to 8 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; common fine roots; common fine interstitial pores; few thin clay films on peds, sand grains, and gravel and some clay films bridging sand grains; about 40 percent gravel; mildly alkaline; clear smooth boundary.

B22t—8 to 12 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, very friable, sticky and nonplastic; common fine roots; common fine interstitial pores; few thin clay films on peds, sand grains, and gravel and some clay films bridging sand grains; 40 percent gravel; slightly effervescent; calcium carbonate disseminated and as a few thin patches on coarse fragments; moderately alkaline; clear smooth boundary.

B3ca—12 to 17 inches; light reddish brown (5YR 6/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; common fine interstitial pores; about 60 percent gravel; strongly effervescent; calcium carbonate disseminated and as few thin patches on coarse fragments; moderately alkaline; abrupt wavy boundary.

C1cam—17 to 19 inches; pink (7.5YR 8/4) very gravelly sandy loam, light brown (7.5YR 6/4) moist, massive; weakly cemented with caliche and highly fractured; thin laminar layer of calcium carbonate about 1/8 inch thick on surface can be dug out with a spade.

C2ca—19 to 30 inches; pink (7.5YR 8/4) very gravelly sandy loam, light brown (7.5YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine interstitial pores; about 45 percent gravel; violently effervescent; coatings of calcium carbonate on coarse fragments and some bridges of calcium carbonate between coarse fragments; moderately alkaline; clear smooth boundary.

C3ca—30 to 60 inches; pink (7.5YR 7/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine interstitial pores; about 45 percent gravel and

cobbles; violently effervescent; coatings of calcium carbonate on coarse fragments; moderately alkaline.

## Pajarito Series

The soils in the Pajarito series are classified as Typic Camborthids, coarse-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on terraces and benches of old flood plains and alluvial fans. Slope is 0 to 15 percent. Elevation is 4,150 to 5,100 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Pajarito gravelly sandy loam in an area of Canutio-Pajarito association, moderately rolling, about 14 miles north of Truth or Consequences, in the SE1/4SE1/4NW1/4 of sec. 30, T. 11 S., R. 3 W.

A1—0 to 4 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 17 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21—4 to 10 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; 10 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B22—10 to 18 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; common very fine interstitial pores; 10 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1ca—18 to 30 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; 12 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; clear smooth boundary.

C2ca—30 to 60 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; 5 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline.

The A horizon is gravelly sandy loam, fine sandy loam, or loamy sand. The B horizon is brown or light brown



loam, sandy loam, or fine sandy loam and is less than 18 percent clay. The C horizon is very pale brown, light brown, light yellowish brown, and pink fine sandy loam, loam, sandy loam, coarse silt loam, or loamy sand.

## Pena Series

The soils in the Pena series are classified as Aridic Calciustolls, loamy-skeletal, mixed, mesic. These deep, well drained soils formed in mixed alluvium. They are on dissected piedmonts. Slope is 5 to 35 percent. Elevation is 6,300 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 47 to 55 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Pena gravelly sandy loam in an area of Goldust-Pena association, hilly, about 3 miles northwest of Winston, in the NW1/4NW1/4SE1/4 of sec. 16, T. 11 S., R. 8 W.

- A1—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots; common fine interstitial pores; 30 percent igneous gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
- B21—2 to 8 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; common fine interstitial pores; 30 percent igneous gravel and 5 percent cobbles; strongly effervescent; calcium carbonate disseminated and as thin coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- B22—8 to 13 inches; grayish brown (10YR 5/2) very gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; common fine interstitial pores; 35 percent igneous gravel and 5 percent cobbles; strongly effervescent; calcium carbonate disseminated and as filaments and coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- B3ca—13 to 25 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; 40 percent igneous gravel and 5 percent cobbles; strongly effervescent; calcium carbonate disseminated and as soft filaments and coatings on coarse fragments; moderately alkaline; clear smooth boundary.
- C1ca—25 to 42 inches; white (10YR 8/2) very gravelly loam, pale brown (10YR 6/3) moist; massive; soft,

very friable, nonsticky and nonplastic; few medium roots; 40 percent igneous gravel and 5 percent cobbles; violently effervescent; calcium carbonate as soft masses and coatings on coarse fragments; moderately alkaline; clear smooth boundary.

C2ca—42 to 60 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; hard, friable, nonsticky and nonplastic; common fine interstitial pores; 45 percent igneous gravel and 5 percent cobbles; violently effervescent; calcium carbonate disseminated and as thin coatings on coarse fragments; moderately alkaline.

Depth to the calcic horizon is 15 to 36 inches. Coarse fragments make up 35 to 50 percent of the control section. They are dominantly gravel, but they are as much as 1 to 10 percent cobbles in some areas.

## Pinaleno Series

The soils in the Pinaleno series are classified as Typic Haplargids, loamy-skeletal, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on piedmonts, high valley terraces, and alluvial fans. Slope is 3 to 15 percent. Elevation is 4,300 to 5,700 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Pinaleno very gravelly sandy loam in an area of Pinaleno-Nolam association, moderately sloping, about 22 miles north of Truth or Consequences, near the northeast corner of the SE1/4 of sec. 6, T. 10 S., R. 3 W.

- A1—0 to 3 inches; reddish brown (5YR 5/4) very gravelly sandy loam, dark reddish brown (5YR 3/4) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine vesicular pores and common fine interstitial pores; about 55 percent gravel; mildly alkaline; clear smooth boundary.
- B21t—3 to 13 inches; reddish brown (5YR 5/4) very gravelly heavy sandy loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; common fine roots; common fine interstitial pores; thin patchy clay films on sand grains and gravel; about 40 percent gravel; mildly alkaline; clear smooth boundary.
- B3t—13 to 28 inches; yellowish red (5YR 5/6) very gravelly sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and nonplastic; few fine roots; common fine interstitial pores; thin patchy clay films on sand grains and gravel; 50 percent gravel; mildly alkaline; clear smooth boundary.



C1ca—28 to 40 inches; reddish yellow (5YR 6/6) very gravelly sandy loam, yellowish red (5YR 4/6) moist; massive; hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; about 60 percent gravel; strongly effervescent; thin patchy calcium carbonate coatings on coarse fragments; moderately alkaline; gradual smooth boundary.

C2ca—40 to 60 inches; reddish yellow (5YR 6/6) very gravelly sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial pores; about 60 percent gravel; strongly effervescent; thin patchy calcium carbonate coatings on coarse fragments; moderately alkaline.

The solum ranges from 15 to 40 inches in thickness. Content of gravel is 35 to 65 percent. Content of cobbles is 1 to 15 percent. A weak desert pavement is on the surface in some pedons. The C horizon is reddish brown or reddish yellow.

### Reakor Series

The soils in the Reakor series are classified as Typic Calciorthids, fine-silty, mixed, thermic. These deep, well drained soils formed in mixed alluvium (fig. 18). They are on piedmonts. Slope is 1 to 5 percent. Elevation is 4,100 to 5,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Reakor silt loam in an area of Reakor-Dona Ana association, gently sloping, about 28 miles southeast of Truth or Consequences, in the northeast corner of the SW1/4SW1/4 of sec. 12, T. 17 S., R. 1 W.

A1—0 to 3 inches; light brown (7.5YR 6/4) silt loam, dark brown (7.5YR 4/4) moist; weak thin platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores and common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21—3 to 22 inches; light brown (7.5YR 6/4) silty clay loam, dark brown (7.5YR 4/4) moist; weak moderate subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1ca—22 to 30 inches; pink (7.5YR 7/4) silty clay loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine interstitial pores; violently effervescent; calcium carbonate disseminated and as soft masses; moderately alkaline; clear smooth boundary.

C2—30 to 66 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; massive; hard,



Figure 18.—A profile of Reakor silt loam in an area of Reakor-Dona Ana association, gently sloping. A calcic horizon is at a depth of about 22 inches.



friable, sticky and plastic; common very fine interstitial pores; violently effervescent; calcium carbonate disseminated and as few fine soft masses; moderately alkaline.

Depth to the calcic horizon ranges from 20 to 40 inches. The C horizon has 15 to 40 percent calcium carbonate equivalent.

## Redbank Series

The soils in the Redbank series are classified as Ustic Torrifluvents, coarse-loamy, mixed (calcareous), mesic. These deep, well drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 5 percent. Elevation is 5,800 to 6,500 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 50 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Redbank loam in an area of Redbank-Torrifluvents association, gently sloping, about 4 miles northwest of Monticello; near the northeast corner of the NW1/4SW1/4 of sec. 6, T. 10 S., R. 6. W.

C1—0 to 10 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; mildly alkaline; clear smooth boundary.

C2—10 to 38 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C3—38 to 60 inches; brown (7.5YR 5/2) loam, dark brown (7.5YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline.

Some pedons have as much as 15 percent coarse fragments.

## Rizozo Series

The soils in the Rizozo series are classified as Lithic Ustic Torriorthents, loamy, mixed (calcareous), mesic. These shallow, well drained soils formed in material derived dominantly from sandstone with some influence from shale. They are on hills and low mountains. Slope is 15 to 55 percent. Elevation is 5,600 to 7,500 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 54 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Rizozo stony loam in an area of Rock outcrop-Rizozo association, extremely steep, about 3 miles northeast of Winston, near the center of the SW1/4NE1/4 of sec. 7, T. 11 S., R. 7 W.

A11—0 to 2 inches; reddish brown (5YR 5/4) stony loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores and common very fine interstitial pores; about 10 percent stones, 10 percent flagstones, and 15 percent gravel; mildly alkaline; clear smooth boundary.

A12—2 to 6 inches; reddish brown (2.5YR 5/4) stony loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common very fine interstitial pores and few fine tubular pores; 15 percent flagstones and stones and 15 percent gravel; slightly effervescent in some small areas; mildly alkaline; clear smooth boundary.

C1—6 to 10 inches; reddish brown (2.5YR 5/4) gravelly loam, reddish brown (2.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common very fine interstitial pores; 20 percent gravel, 5 percent flagstones, and 5 percent stones; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on some coarse fragments; moderately alkaline; abrupt wavy boundary.

R—10 inches; sandstone; surface coated with thin patchy calcium carbonate films.

Depth to sandstone is 4 to 20 inches.

## Scholle Series

The soils in the Scholle series are classified as Ustollic Haplargids, fine-loamy, mixed, mesic. These deep, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 15 percent. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 54 to 58 degrees F, and the frost-free period is 140 to 180 days.

Typical pedon of Scholle very gravelly loam in an area of Scholle-Ildefonso association, moderately rolling, about 2 miles southeast of Lake Valley, near the southwest corner of the SE1/4SW1/4 of sec. 27, T. 18 S., R. 7 W.

A1—0 to 5 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak medium platy structure parting to common fine granular; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores and



common very fine interstitial pores; about 50 percent of the surface is covered with igneous gravel; 30 percent igneous gravel in horizon; mildly alkaline; clear smooth boundary.

B2t—5 to 10 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; common medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common very fine interstitial pores; 25 percent igneous gravel and 5 percent cobbles; common thin clay films on faces of peds, coating coarse fragments, and bridging sand grains; moderately alkaline; clear smooth boundary.

B22t—10 to 24 inches; reddish brown (5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; common very fine interstitial pores; 25 percent igneous gravel and 5 percent cobbles; common thin clay films on faces of peds, coating coarse fragments, and bridging sand grains; slightly effervescent on some peds; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B3tca—24 to 33 inches; light reddish brown (5YR 6/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common very fine interstitial pores; 25 percent igneous gravel and 5 percent cobbles; few thin clay films on sand grains and bridging sand grains; strongly effervescent; calcium carbonate disseminated and as common fine and medium soft masses; moderately alkaline; clear smooth boundary.

C1ca—33 to 42 inches; light reddish brown (5YR 6/4) gravelly clay loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine interstitial pores; 30 percent igneous gravel and 5 percent cobbles; strongly effervescent; calcium carbonate disseminated and as many fine to medium soft masses and nearly continuous coatings on coarse fragments; moderately alkaline; clear wavy boundary.

C2ca—42 to 60 inches; light reddish brown (5YR 6/4) gravelly clay loam, reddish brown (5YR 4/4) moist; massive; hard, friable, sticky and slightly plastic; common fine interstitial pores; 15 percent igneous gravel and 5 percent cobbles; violently effervescent; calcium carbonate disseminated and as many medium soft masses and nearly continuous coatings on coarse fragments; moderately alkaline.

The solum ranges from 12 to 36 inches in thickness. Content of gravel in the control section averages 15 to 35 percent. A weak desert pavement is on the surface in

some pedons. The Bt horizon is brown or reddish brown gravelly clay loam. The C horizon is light reddish brown, light brown, or pink gravelly clay loam or very gravelly clay loam.

## Simona Series

The soils in the Simona series are classified as Typic Paleorthids, loamy, mixed, thermic, shallow. These shallow, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 9 percent. Elevation is 4,050 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Simona loamy fine sand, gently sloping, about 8 miles northeast of Engle, or 0.1 mile southwest of the NW1/4NW1/4NE1/4 of sec. 6, T. 12 S., R. 1 W.

A1—0 to 4 inches; light brown (7.5YR 6/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 5 percent caliche gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

B21—4 to 15 inches; light brown (7.5YR 6/4) gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and very fine roots; many very fine and fine interstitial pores and few fine tubular pores; 17 percent caliche gravel; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Ccam—15 to 60 inches; indurated caliche coated with a laminar layer; the lower part is cemented gravel that can be dug with a shovel.

Depth to indurated caliche ranges from 7 to 20 inches. The profile is mildly alkaline or moderately alkaline.

The A horizon is 5 to 15 percent gravel. The B horizon is 15 to 35 percent gravel. The Ccam horizon is 18 to 36 inches thick. The underlying cemented gravel commonly is nodular.

## Sotim Series

The soils in the Sotim series are classified as Typic Calciorthids, fine-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on alluvial fans, flood plains, and terraces and in swales. Slope is 1 to 5 percent. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The



average annual air temperature is about 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Sotim silty clay loam in an area of Largo-Sotim association, gently sloping, about 4 miles southwest of the Upham railroad siding, near the center of the NE1/4 of sec. 15, T. 17 S., R. 2 W.

A1—0 to 3 inches; light reddish brown (5YR 6/4) silty clay loam, reddish brown (5YR 4/4) moist; weak medium platy structure; hard, friable, sticky and plastic; few fine roots; few fine vesicular pores and common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21—3 to 11 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B22—11 to 21 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B3ca—21 to 29 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; very fine interstitial pores; violently effervescent; calcium carbonate disseminated and in few thin seams; moderately alkaline; clear smooth boundary.

C1ca—29 to 42 inches; pink (5YR 7/4) clay loam, light reddish brown (5YR 6/4) moist; massive; hard, friable, sticky and plastic; common very fine interstitial pores; violently effervescent; calcium carbonate disseminated and as many medium soft masses; moderately alkaline; clear smooth boundary.

C2—42 to 60 inches; pink (5YR 7/4) loam, reddish brown (5YR 5/4) moist; massive; hard, friable, sticky and slightly plastic; common very fine pores; violently effervescent; calcium carbonate disseminated and as many medium soft masses; moderately alkaline.

Thickness of the solum and depth to the calcic horizon are 20 to 40 inches. Coarse fragments in the profile range from 0 to 15 percent. The profile is mildly alkaline or moderately alkaline.

## Stellar Series

The soils in the Stellar series are classified as Ustollic Haplargids, fine, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on

piedmonts. Slope is 1 to 9 percent. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Stellar loam in an area of Stellar-Continental association, gently sloping, about 5 miles east of Lake Valley, near the northwest corner of the SW1/4NW1/4SW1/4 of sec. 5, T. 19 S., R. 6 W.

A1—0 to 2 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine vesicular pores; about 20 percent igneous gravel on the surface; mildly alkaline; clear smooth boundary.

B1t—2 to 7 inches; reddish brown (5YR 5/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine interstitial pores; few clay stains on mineral grains and coarse fragments; mildly alkaline; clear smooth boundary.

B21t—7 to 20 inches; reddish brown (5YR 5/4) heavy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; common very fine interstitial pores; few thin clay films on faces of peds, lining pores, bridging sand grains, and coating coarse fragments; moderately alkaline; clear smooth boundary.

B22tca—20 to 38 inches; reddish brown (5YR 5/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common very fine interstitial pores; few thin clay films on faces of peds, lining pores, and bridging sand grains; strongly effervescent; calcium carbonate disseminated and as few fine soft masses; moderately alkaline; clear smooth boundary.

C1ca—38 to 56 inches; pink (5YR 7/4) clay loam, reddish brown (5YR 5/4) moist; massive; hard, firm, sticky and slightly plastic; few very fine interstitial pores; about 15 percent gravel; violently effervescent; calcium carbonate as many medium soft masses and coating coarse fragments; moderately alkaline; clear smooth boundary.

C2ca—56 to 60 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 4/4) moist; massive; hard, firm, sticky and slightly plastic; common very fine interstitial pores; violently effervescent; common medium soft masses of calcium carbonate; moderately alkaline.

The depth to the calcic horizon ranges from 20 to 40 inches.



The A horizon is 0 to 15 percent gravel. From 5 to 25 percent of the surface is covered with gravel. The Cca horizon in some pedons has thin strata that are 5 to 25 percent gravel, but the horizon averages less than 15 percent gravel throughout.

## Tencee Series

The soils in the Tencee series are classified as Typic Paleorthids, loamy-skeletal, carbonatic, thermic, shallow. These shallow, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 1 to 15 percent. Elevation is 4,100 to 5,800 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Tencee very gravelly fine sandy loam in an area of Delnorte-Cave-Tencee complex, moderately rolling, about 13 miles east of Derry, near the northwest corner of the NE1/4SE1/4SW1/4 of sec. 32, T. 17 S., R. 2 W.

A1—0 to 2 inches; light brown (7.5YR 6/4) very gravelly fine sandy loam, brown (7.5YR 4/4) moist; weak fine platy structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; common fine vesicular pores; about 40 percent mixed gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; clear smooth boundary.

C1ca—2 to 12 inches; light brown (7.5YR 6/4) gravelly loam, light brown (7.5YR 6/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; about 30 percent gravel and 5 percent cobbles; violently effervescent; calcium carbonate disseminated, as nearly continuous coatings on coarse fragments, and as hard caliche fragments; moderately alkaline; clear smooth boundary.

C2ca—12 to 16 inches; pink (7.5YR 7/4) very gravelly loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; about 50 percent gravel and a trace of cobbles; violently effervescent; calcium carbonate disseminated, as continuous coatings on coarse fragments, and as many hard caliche fragments; moderately alkaline; abrupt wavy boundary.

C3cam—16 to 60 inches; pinkish white (7.5YR 8/2) indurated caliche and gravel and strata of loose to very hard gravelly sandy loam and very gravelly loam; laminar layer about 1/8 inch thick on surface.

Depth to the Ccam horizon ranges from 4 to 20 inches. Coarse fragments are mostly caliche and make

up to 60 percent of the control section. More than 40 percent of the profile is calcium carbonate.

The A horizon is light brown or pale brown very gravelly loam or very gravelly fine sandy loam. The Cca horizon is pale brown, light brown, pink, pinkish white, or white.

The Ccam horizon is 12 to 40 inches thick. The cemented strata decrease in hardness below a depth of 34 inches and increase in hardness below this depth.

## Thunderbird Series

The soils in the Thunderbird series are classified as Aridic Argiustolls, fine, montmorillonitic, mesic. These moderately deep, well drained soils formed in residuum and eolian material derived dominantly from basalt. They are on basalt lava flows. Slope is 1 to 10 percent. Elevation is 5,200 to 7,000 feet. The average annual precipitation is 11 to 13 inches. The average annual air temperature is 50 to 58 degrees F, and the frost-free period is 120 to 180 days.

Typical pedon of Thunderbird loam in an area of Thunderbird-Cabazon association, moderately rolling, about 6 miles northwest of the Ladder Ranch headquarters, 30 feet east of the northwest corner of sec. 4, T. 14 S., R. 7 W.

A1—0 to 2 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure parting to moderate fine and very fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots and few coarse roots; common very fine interstitial pores; 5 percent gravel and a trace of cobbles and stones on the surface; neutral; abrupt smooth boundary.

B1t—2 to 5 inches; dark brown (7.5YR 4/2) clay loam, very dark brown (7.5YR 2/2) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots and very fine and few coarse roots; common very fine tubular and interstitial pores; common thin clay films on faces of peds and lining pores; 5 percent gravel; mildly alkaline; clear smooth boundary.

B21t—5 to 11 inches; dark brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine and very fine roots; few very fine tubular pores and common very fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; mildly alkaline; clear smooth boundary.

B22t—11 to 19 inches; dark brown (7.5YR 4/4) gravelly clay, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common very fine interstitial pores; common thin clay films on faces of



pedes; 20 percent gravel; mildly alkaline; clear smooth boundary.

C—19 to 26 inches; dark brown (7.5YR 4/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; hard, firm, sticky and plastic; 50 percent gravel; strongly effervescent; mildly alkaline; clear wavy boundary.

R—26 inches; basalt.

Depth to basalt ranges from 20 to 40 inches. From 2 to 15 percent of the surface is covered with gravel, cobbles, and stones.

The A horizon is 5 to 15 percent gravel, cobbles, and stones. The Bt horizon is 5 to 35 percent coarse fragments, the content of which commonly increases in the lower part. The C horizon is 35 to 70 percent basalt gravel, cobbles, and stones. The R horizon has thin patchy coatings of caliche on the surface in some pedons.

### Torrifluvents

Torrifluvents are deep, well drained to excessively drained soils on flood plains that are reworked during frequent periods of runoff. They formed in mixed alluvium. Slope is 0 to 9 percent. Elevation is 5,800 to 6,500 feet. The average annual precipitation is 11 to 13 inches. The average annual temperature is 50 to 58 degrees F, and the average frost-free period is 140 to 180 days.

Sample pedon of Torrifluvents very gravelly loamy sand in an area of Redbank-Torrifluvents association, gently sloping, about 1,320 feet north and 1,320 feet west of the southeast corner of sec. 18, T. 10 S., R. 6 W.

A—0 to 10 inches; pinkish gray (7.5YR 6/2) very gravelly loamy sand, brown (7.5YR 4/2) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; common fine interstitial pores; 5 percent cobbles and 50 percent gravel; mildly alkaline; clear wavy boundary.

C—10 to 60 inches; light brown (7.5YR 6/4) highly stratified material that averages very gravelly loamy sand; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots to a depth of 30 inches; common fine and medium interstitial pores; 5 percent cobbles and 55 percent gravel; moderately alkaline; neutral to moderately alkaline.

The C horizon is highly stratified gravelly, very gravelly, cobbly, and very cobbly fine sand, loamy sand, and sand.

### Torriorthents

Torriorthents are shallow to deep, well drained soils on truncated piedmonts and hillsides. The soils formed in mixed colluvium and alluvium. Slope is 5 to 75 percent. Elevation is 4,050 to 6,800 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 65 degrees F, and the average frost-free period is 170 to 220 days.

Sample pedon of Torriorthents cobbly loam in an area of Torriorthents dissected-Rock outcrop association, very steep, near the center of sec. 2, T. 17 S., R. 4 W.

A—0 to 3 inches; brown (7.5YR 5/4) cobbly loam, brown (7.5YR 4/4) moist; weak medium and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; 10 percent cobbles and 10 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—3 to 10 inches; light brown (7.5YR 6/4) very cobbly loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; 15 percent cobbles and 25 percent gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; moderately alkaline; abrupt wavy boundary.

IIC2—10 to 60 inches; light brown (7.5YR 6/4) highly stratified gravelly loam, cobbly sandy loam, and very gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots to a depth of 36 inches; common fine and medium interstitial pores; 10 percent cobbles and 30 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Coarse fragments cover 20 to 70 percent of the surface and make up 5 to 60 percent of the profile. Depth to bedrock ranges from 4 to 60 inches. Bedrock is mostly limestone, acid igneous rock, or metamorphic rock.

The IIC2, where present, is highly stratified loam and sandy loam and is 15 to 60 percent gravel and 5 to 25 percent cobbles.

### Tres Hermanos Series

The soils in the Tres Hermanos series are classified as Typic Haplargids, fine-loamy, mixed, thermic. These deep, well drained soils formed in gravelly mixed alluvium. They are on piedmonts. Slope is 1 to 10 percent. Elevation is 4,050 to 5,900 feet. The average annual precipitation is 8 to 10 inches. The average



annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Tres Hermanos gravelly loam in an area of Tres Hermanos-Hap association, gently sloping, about 9 miles west of Truth or Consequences, near the northeast corner of the NW1/4SW1/4 of sec. 29, T. 13 S., R. 5 W.

A1—0 to 3 inches; light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak medium platy structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common fine vesicular pores and common very fine interstitial pores; about 25 percent gravel; a weak desert pavement is on the surface; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21t—3 to 11 inches; brown (7.5YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; few thin clay films coating and bridging sand grains; common very fine interstitial pores; about 18 percent gravel; slightly effervescent; calcium carbonate disseminated and as thin patchy coatings on underside of coarse fragments; moderately alkaline; clear smooth boundary.

B3tca—11 to 16 inches; brown (5YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; few thin clay stains on sand grains; common very fine interstitial pores; about 30 percent gravel and traces of cobbles; strongly effervescent; calcium carbonate disseminated and as common fine patchy coatings on underside of coarse fragments; moderately alkaline; clear wavy boundary.

C1ca—16 to 22 inches; pink (7.5YR 7/4) extremely gravelly loam, light brown (7.5YR 6/4) moist; massive; extremely hard, friable, slightly sticky and nonplastic; few fine roots; few fine interstitial pores; about 65 percent gravel and 5 percent cobbles; violently effervescent; calcium carbonate disseminated and as patchy coatings on coarse fragments and bridges between coarse fragments; moderately alkaline; clear wavy boundary.

C2ca—22 to 60 inches; pink (7.5YR 7/4) extremely gravelly sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial pores; about 65 percent gravel and 5 percent cobbles; violently effervescent; calcium carbonate disseminated and as patchy coatings on coarse fragments; moderately alkaline.

Thickness of the solum and depth to the calcic horizon range from 12 to 30 inches. Reaction in the solum is mildly alkaline or moderately alkaline.

The A horizon is brown or light brown gravelly fine sandy loam or gravelly loam. The Bt horizon is brown or reddish brown gravelly sandy clay loam or gravelly clay loam. The C horizon is light brown, light reddish brown, or pink very gravelly sandy clay loam, extremely gravelly sandy loam, extremely gravelly loam, or gravelly loam.

## Ustorthents

Ustorthents are deep, well drained soils that formed in mixed alluvium and colluvium. They are on truncated piedmonts. Slope is 35 to 150 percent. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 54 to 58 degrees F, and the frost-free period is 140 to 180 days.

Sample pedon of Ustorthents in an area of Ustorthents dissected-IIdefonso complex, extremely steep; near the northwest corner of the SE1/4SE1/4 of sec. 28, T. 10 S., R. 6 W.

C1—0 to 10 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial pores; 5 percent cobbles and 40 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

IIC2—10 to 60 inches; pink (7.5YR 7/4) highly stratified very gravelly and very cobbly loam and sandy loam, brown (7.5YR 5/4) moist; massive; hard, very friable, nonsticky and nonplastic; few fine roots to a depth of 24 inches; many interstitial pores; 5 percent cobbles and 50 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The profile is 1 to 15 percent cobbles, 15 to 60 percent gravel, and 0 to 5 percent stones throughout. Reaction is mildly alkaline or moderately alkaline.

An A horizon is present in some pedons. The IIC2 horizon is stratified with gravelly, very gravelly, cobbly, or very cobbly loam or sandy loam. Some thin strata are weakly cemented.

## Vinton Series

The soils in the Vinton series are classified as Typic Torrifluvents, sandy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 1 percent. Elevation is 4,120 to 4,300 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Vinton loam in an area of Anthony-Vinton loams, about 15 miles south of Truth or



Consequences; about 10 feet west of the irrigation ditch and 0.1 mile south of the irrigation pump, in the NE1/4SE1/4SE1/4 of sec. 1, T. 17 S., R. 5 W.

Ap—0 to 16 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

C1—16 to 22 inches; light gray (10YR 7/2) fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—22 to 45 inches; light gray (10YR 7/2) loamy fine sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; slightly effervescent; moderately alkaline; clear smooth boundary.

C3—45 to 50 inches; light gray (10YR 7/2) fine sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many fine interstitial pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C4—50 to 60 inches; light gray (10YR 7/2) loamy sand, dark brown (10YR 4/3) moist; single grain; soft, very friable, slightly sticky and slightly plastic; common fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Reaction of the profile is mildly alkaline or moderately alkaline. A fluctuating water table is at a depth of 5 to 7 feet in some areas.

The A horizon is pale brown, light brown, grayish brown clay loam, loam, or fine sandy loam. The C horizon is light gray, pale brown, very pale brown, light brownish gray, or light brown, stratified loamy fine sand, loamy sand, or fine sand.

## Wink Series

The soils in the Wink series are classified as Typic Calciorthids, coarse-loamy, mixed, thermic. These deep, well drained soils formed in mixed alluvium. They are on piedmonts. Slope is 0 to 5 percent. Elevation is 4,100 to 5,400 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Wink loamy fine sand in an area of Wink-Dona Ana association, gently sloping, about 0.1 mile south of the northwest corner of the SW1/4 of sec. 18, T. 13 S., R. 1 W.

A1—0 to 2 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B21—2 to 14 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; many very fine interstitial pores and few fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

B22ca—14 to 20 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and common fine roots; many very fine interstitial pores and few fine tubular pores; 15 percent mixed igneous and caliche gravel; strongly effervescent; calcium carbonate disseminated and as few thin filaments; moderately alkaline; clear smooth boundary.

Cca—20 to 60 inches; pink (5YR 7/4) gravelly sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots; many very fine interstitial pores and common fine tubular pores; 20 percent mixed igneous and caliche gravel; violently effervescent; calcium carbonate disseminated and as caliche gravel; moderately alkaline.

The A horizon is brown or dark brown silt loam or loamy fine sand. The B2 horizon is reddish yellow, light brown, or brown sandy loam, fine sandy loam, or gravelly fine sandy loam. The C horizon is reddish yellow or very pale brown gravelly sandy loam or sandy loam. It is weakly cemented with caliche in the upper part in some pedons. It is 5 to 35 percent gravel.

## Yturbide Series

The soils in the Yturbide series are classified as Typic Torripsamments, mixed, thermic. These deep, excessively drained soils formed in mixed alluvium. They are on dissected piedmonts and fans. Slope is 3 to 35 percent. Elevation is 4,100 to 5,000 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is about 58 to 65 degrees F, and the frost-free period is 180 to 220 days.

Typical pedon of Yturbide gravelly loamy fine sand in an area of Caliza-Bluepoint-Yturbide association, very steep, about 20 miles north of Truth or Consequences,



near the southwest corner of the NE1/4SE1/4 of sec. 19, T. 10 S., R. 3 W.

A11—0 to 3 inches; yellowish brown (10YR 5/4) gravelly loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; loose, soft, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 30 percent igneous gravel; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

A12—3 to 15 inches; yellowish brown (10YR 5/4) gravelly loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; loose, soft, nonsticky and nonplastic; few fine roots; common fine

interstitial pores; 25 percent igneous gravel; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—15 to 60 inches; light yellowish brown (10YR 6/4) gravelly loamy fine sand, yellowish brown (10YR 5/4) moist; massive; loose, soft, nonsticky and nonplastic; common fine interstitial pores; 25 percent igneous gravel; strongly effervescent; calcium carbonate disseminated and as thin patchy coatings on coarse fragments; mildly alkaline.

The content of gravel averages 15 to 35 percent throughout the profile.



# Formation of the Soils

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Soil is a natural body and is the result of the interaction of five soil-forming factors: climate, plants and animals, parent material, relief, and time. Individual areas of soil range from a few square yards to several hundred acres in size.

Climate and vegetation are considered the active factors in soil formation. They slowly alter the parent material that has accumulated through the weathering of rocks into a natural formation of genetically related horizons. The effects of climate and vegetation are conditioned by relief. The parent material also affects the kind of profile that can be formed and, in extreme cases, determines the profile almost entirely. Finally, time is needed for the formation of diagnostic horizons.

The five factors of soil formation are briefly described in the following paragraphs.

## Climate

The survey is characterized by an arid continental climate. The average annual precipitation is 8 to 10 inches in about 75 percent of the area; 11 to 13 inches in about 20 percent of the area, along the mountainous areas; and as much as 16 inches or more in small areas in the higher mountains. Some small areas near Truth or Consequences receive less than 8 inches of precipitation annually.

Climate directly influences soil formation. A warm, moist climate increases the rate at which organic matter decomposes and parent material weathers. The amount of precipitation and the temperature largely determine the kind and amount of vegetation that grows. The amount of precipitation determines the amount of leaching of bases and carbonates and the amount of clay colloids in the soil.

Dona Ana soils formed under 8 to 10 inches of precipitation annually and typically have a layer of calcium carbonate accumulation at a depth of 18 inches. Goldust soils formed under 11 to 13 inches of precipitation and typically have a layer of calcium carbonate accumulation at a depth of 32 inches.

The sparse grassland vegetation in aridic areas produces little organic matter. The soils that formed in these areas, such as those of the Dona Ana and Tres Hermanos series, have a light colored surface layer that is less than 1 percent organic matter. The western and eastern parts of the area receive more precipitation and

thus produce more vegetation. Goldust soils formed in these parts of the area, and they have a darker colored surface layer that has 1 percent or more organic matter.

## Plants and Animals

Plants help in the formation of soils by sending their roots into the parent material. Plant roots, even though small, are strong. They granulate the soil, rearrange the soil particles, force openings in the lower part of the soil, and increase porosity.

Animals burrow beneath the surface and mix the soil material. When these animals die, their remains decay and form humus in the soil. This humus serves as a source of plant nutrients.

The native vegetation in the part of the survey area at an elevation of less than 6,400 feet consists mainly of short grasses and scattered pinyon and oneseed juniper. Above 6,400 feet, the vegetation is mainly pinyon and oneseed juniper.

The organic matter content of the soils in the area is relatively low, with a slight increase at an elevation of about 5,800 feet and above. This is a result of more effective rainfall and more vegetation.

## Parent Material

The soils in the survey area formed in three major kinds of parent material: alluvial sediment, sedimentary rock, and igneous rock.

The alluvial sediment is material that was deposited in river valleys and on recent stream flood plains, basin floors, piedmont fans, and ancient river terraces. The material has been mixed and sorted in transport and has a wide range in mineralogy and particle size. The areas where alluvial sediment is dominant are in general soil map units 2, 3, 5, 7, 9, and 10.

Sedimentary parent material consists of limestone, sandstone, and shale. Igneous parent material consists of a wide range of acid igneous rock and basic lava flows. The areas of sedimentary and igneous rock are interspersed throughout the hills and mountains. These areas are dominantly in general soil map units 1, 4, 6, and 8.



## Relief

Relief is the inequality and relative difference in elevation of a land surface. It influences soil formation by affecting surface runoff, internal drainage, erosion, and soil temperature. Variations in these factors cause differences in the thickness of the surface layer, depth of the solum, and the degree of horizon differentiation. The north-facing slopes are less exposed to the sun and wind; thus, on these slopes there is more available moisture because of less evaporation, and more vegetation is produced. These factors, in turn, influence the buildup of organic matter in the soil. Soils in drainageways and on basin floors generally support more vegetation and have a higher organic matter content than higher lying soils. The soils that formed on the nearly level valley bottoms are young. Repeated deposition of sediment has slowed development. Soils that formed in gently sloping to steep areas on uplands are generally older. Soils in very steep mountainous areas generally do not form deep profiles because the rate of erosion is nearly the same as that of soil formation.

## Time

Time is very important. The length of time that climate and plants and animals act on a given parent material with specific relief determines degree of development.

Agua, Anapra, Anthony, Arizo, Armijo, Belen, Harkey, and Vinton soils are examples of young soils. They have not developed any clear horizons other than surface horizons. Adelino, Courthouse, La Fonda, and Pajarito soils have existed long enough to allow some movement of clay and carbonates and to develop a weak B horizon or a weak horizon of carbonate accumulation, or both. Berino, Cruces, Dona Ana, Goldust, Muzzler, and Thunderbird soils are older and have strongly developed horizons. These soils have a thick, well developed argillic horizon. They formed under a different climate than is present today in the survey area.

Some soils develop horizons more rapidly than others because of the parent material or the size of the soil particles. Soils high in carbonates develop an argillic horizon slower. Sandy soils leach faster and move material downward faster, thus developing a thicker solum in a shorter period of time.



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# Glossary

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**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Area reclaim (in tables).** An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	<i>Inches</i>
Very low.....	0 to 3.5
Low.....	3.5 to 5.0
Moderate.....	5.0 to 7.5
High.....	7.5 to 10
Very high.....	More than 10

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Base saturation.** The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

**Channery soil.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Climax vegetation.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Coarse fragments.** If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

**Coarse textured soil.** Sand or loamy sand.

**Cobblestone (or cobble).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.



**Colluvium.** Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex slope.** Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern, or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

**Consistence, soil.** The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

*Loose.*—Noncoherent when dry or moist; does not hold together in a mass.

*Friable.*—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

*Firm.*—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Plastic.*—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.

*Sticky.*—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

*Hard.*—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

*Soft.*—When dry, breaks into powder or individual grains under very slight pressure.

*Cemented.*—Hard; little affected by moistening.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Deferred grazing.** Postponing grazing or arresting grazing for a prescribed period.

**Depth to rock** (in tables). Bedrock is too near the surface for the specified use.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial

drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

*Somewhat excessively drained.*—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

*Well drained.*—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

*Moderately well drained.*—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

*Somewhat poorly drained.*—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

*Poorly drained.*—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

*Very poorly drained.*—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently



ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature; for example, fire that exposes the surface.

**Excess fines** (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

**Excess lime** (in tables). Excess carbonates in the soil that restrict the growth of some plants.

**Excess salts** (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fast intake** (in tables). The rapid movement of water into the soil.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fine textured soil.** Sandy clay, silty clay, and clay.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 37.5 centimeters) long.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Foot slope.** The inclined surface at the base of a hill.

**Forb.** Any herbaceous plant not a grass or a sedge.

**Gilgai.** Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

**Gravel.** Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

**Green manure crop** (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water** (geology). Water filling all the unblocked pores of underlying material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

*R layer.*—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.



**Hummocky.** Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky topography resembles rolling or undulating topography, but the tops of ridges are narrower and the sides are shorter and less even.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2.....	very low
0.2 to 0.4.....	low
0.4 to 0.75.....	moderately low
0.75 to 1.25.....	moderate
1.25 to 1.74.....	moderately high
1.75 to 2.5.....	high
More than 2.5.....	very high

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are—  
*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.  
*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Lacustrine deposit** (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Large stones** (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Low strength.** The soil is not strong enough to support loads.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Moderately coarse textured soil.** Sandy loam and fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, and silty clay loam.

**Munsell notation.** A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

**Neutral soil.** A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The downward movement of water through the soil.

**Percolates slowly** (in tables). The slow movement of water through the soil adversely affecting the specified use.



**Permeability.** The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow.....	less than 0.06 inch
Slow.....	0.06 to 0.20 inch
Moderately slow.....	0.2 to 0.6 inch
Moderate.....	0.6 inch to 2.0 inches
Moderately rapid.....	2.0 to 6.0 inches
Rapid.....	6.0 to 20 inches
Very rapid.....	more than 20 inches

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Range condition.** The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

**Range site.** An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid.....	Below 4.5
Very strongly acid.....	4.5 to 5.0
Strongly acid.....	5.1 to 5.5
Medium acid.....	5.6 to 6.0
Slightly acid.....	6.1 to 6.5
Neutral.....	6.6 to 7.3
Mildly alkaline.....	7.4 to 7.8
Moderately alkaline.....	7.9 to 8.4
Strongly alkaline.....	8.5 to 9.0
Very strongly alkaline.....	9.1 and higher

**Residuum (residual soil material).** Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rippable.** Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Rooting depth** (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-size particles.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05



millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**Slow Intake** (in tables). The slow movement of water into the soil.

**Small stones** (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millime- ters
Very coarse sand.....	2.0 to 1.0
Coarse sand.....	1.0 to 0.5
Medium sand.....	0.5 to 0.25
Fine sand.....	0.25 to 0.10
Very fine sand.....	0.10 to 0.05
Silt.....	0.05 to 0.002
Clay.....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Thin layer** (in tables). Otherwise suitable soil material too thin for the specified use.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toe slope.** The outermost inclined surface at the base of a hill; part of a foot slope.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Tuff.** A compacted deposit that is 50 percent or more volcanic ash and dust.

**Upland** (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Variant, soil.** A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.



# Tables

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TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1897-1979  
at Elephant Butte Dam, N. Mex]

Month	Temperature		Precipitation	
	Average daily maximum	Average daily minimum	Average monthly total	Average number of days with 0.10 inch or more precipitation
	<u>°F</u>	<u>°F</u>	<u>In</u>	
January----	54	28	0.35	1
February---	60	32	0.28	1
March-----	66	37	0.25	1
April-----	75	45	0.26	1
May-----	83	53	0.27	1
June-----	92	63	0.58	2
July-----	92	67	1.56	4
August-----	90	65	1.93	4
September--	85	59	1.23	3
October----	76	48	0.70	2
November---	63	35	0.25	1
December---	54	28	0.50	1
Year-----	74	47	8.16	22



TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Adelino loam-----	392	*
2	Agua loam-----	597	*
3	Agustin gravelly sandy loam, 1 to 9 percent slopes-----	755	*
4	Akela very gravelly loam, moderately rolling-----	25,382	1.3
5	Akela-Rock outcrop association, very steep-----	19,374	1.0
6	Anapra clay loam-----	205	*
7	Anthony-Vinton fine sandy loams-----	979	0.1
8	Anthony-Vinton loams-----	615	*
9	Anthony-Vinton clay loams-----	205	*
10	Aridic Argiustolls-Goldust association, extremely steep-----	16,872	0.9
11	Aridic Haplustalfs-Rock outcrop complex, extremely steep-----	12,100	0.6
12	Arizo-Riverwash complex, 1 to 3 percent slopes-----	597	*
13	Arizo and Canutio soils, gently sloping-----	16,354	0.8
14	Armijo clay, 0 to 3 percent slopes-----	5,696	0.3
15	Armijo clay, alkali, 0 to 2 percent slopes-----	1,706	0.1
16	Badland-Nickel complex, extremely steep-----	18,104	0.9
17	Belen clay loam-----	382	*
18	Berino-Dona Ana complex, hummocky-----	13,630	0.7
19	Berino-Dona Ana association, gently sloping-----	37,000	1.9
20	Bluepoint loamy sand, 1 to 5 percent slopes-----	820	0.1
21	Bluepoint loamy fine sand, moderately rolling-----	9,095	0.5
22	Brazito loamy fine sand-----	503	*
23	Brazito loamy fine sand, gently sloping-----	2,958	0.2
24	Brazito very fine sandy loam-----	429	*
25	Caliza-Bluepoint-Yturbide association, very steep-----	8,683	0.5
26	Canutio-Pajarito association, moderately rolling-----	5,176	0.3
27	Cave gravelly fine sandy loam, moderately undulating-----	11,203	0.6
28	Courthouse-Rock outcrop association, very steep-----	24,334	1.3
29	Cruces-Cacique complex, hummocky-----	21,813	1.1
30	Delnorte-Cave-Tencee complex, moderately rolling-----	156,674	8.1
31	Dona Ana complex, hummocky-----	18,796	1.0
32	Dona Ana-Tres Hermanos association, gently sloping-----	68,621	3.6
33	Eba very gravelly loam, gently sloping-----	18,082	0.9
34	Elbutte-Courthouse complex, moderately rolling-----	39,324	2.0
35	Glendale loam-----	317	*
36	Glendale clay loam-----	652	*
37	Glendale-Gila complex, nearly level-----	13,242	0.7
38	Goldust very gravelly clay loam, very steep-----	20,300	1.1
39	Goldust-Pena association, hilly-----	22,384	1.2
40	Harkey fine sandy loam-----	233	*
41	Harkey loam-----	1,808	0.1
42	Harkey loam, saline and alkali-----	354	*
43	Harkey clay loam-----	373	*
44	Holloman fine sandy loam, moderately undulating-----	8,892	0.5
45	Holloman Variant clay loam, moderately undulating-----	1,240	0.1
46	Ildefonso-Scholle association, hilly-----	36,226	1.9
47	La Fonda loam, gently sloping-----	4,235	0.2
48	Largo very fine sandy loam, gently sloping-----	6,774	0.4
49	Largo-Sotim association, gently sloping-----	13,264	0.7
50	Lehmans-Luzena association, very steep-----	10,688	0.6
51	Lithic Haplargids, moderately sloping-----	3,361	0.2
52	Lozier-Rock outcrop association, hilly-----	18,815	1.0
53	Luzena-Rock outcrop association, very steep-----	182,512	9.5
54	Manzano loam, gently sloping-----	2,223	0.1
55	Marconi silty clay loam, 0 to 3 percent slopes-----	3,091	0.2
56	Mimbres silt loam, gently sloping-----	10,573	0.5
57	Mimbres silt loam-----	559	*
58	Mimbres clay loam-----	839	0.1
59	Minlith-Rock outcrop association, moderately rolling-----	6,343	0.3
60	Muzzler very gravelly loam, hilly-----	17,208	0.9
61	Muzzler-Rock outcrop association, extremely steep-----	12,234	0.6
62	Nickel very gravelly fine sandy loam, very steep-----	195,443	10.2
63	Nickel-Chamberino association, gently sloping-----	75,903	3.9
64	Nickel-Tencee-Delnorte complex, moderately sloping-----	74,171	3.8
65	Pajarito loamy sand, 1 to 5 percent slopes-----	410	*
66	Pajarito fine sandy loam-----	2,423	0.1
67	Pinaleno-Nolam association, moderately sloping-----	6,319	0.3
68	Reakor-Dona Ana association, gently sloping-----	22,539	1.2
69	Redbank-Torrifluvents association, gently sloping-----	6,386	0.3
70	Rock outcrop, extremely steep-----	6,856	0.4

See footnote at end of table.



TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
71	Rock outcrop-Courthouse complex, extremely steep-----	37,527	1.9
72	Rock outcrop-Deama association, extremely steep-----	38,923	2.0
73	Rock outcrop-Luzena association, extremely steep-----	68,900	3.6
74	Rock outcrop-Rizozo association, extremely steep-----	2,017	0.1
75	Rock outcrop-Torriorthents association, extremely steep-----	69,837	3.6
76	Scholle-Ildefonso association, moderately rolling-----	49,676	2.6
77	Simona loamy fine sand, gently sloping-----	88,758	4.6
78	Stellar-Continental association, gently sloping-----	57,978	3.0
79	Thunderbird-Cabazon association, moderately rolling-----	15,662	0.8
80	Torriorthents dissected-Rock outcrop association, very steep-----	5,243	0.3
81	Tres Hermanos gravelly fine sandy loam, gently sloping-----	28,905	1.5
82	Tres Hermanos-Hap association, gently sloping-----	39,290	2.0
83	Urban land-----	298	*
84	Ustorthents dissected-Ildefonso complex, extremely steep-----	10,688	0.6
85	Wink silt loam, gently sloping-----	1,210	0.1
86	Wink-Dona Ana association, gently sloping-----	39,331	2.0
W	Water-----	26,600	1.4
	Total-----	1,927,489	100.0

\* Less than 0.1 percent.



TABLE 3.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to crops and pasture are listed]

Soil name and map symbol	Alfalfa hay	Corn silage	Cotton lint	Lettuce	Fresh chili peppers	Wheat
	<u>Ton</u>	<u>Ton</u>	<u>Lb</u>	<u>Crate</u>	<u>Ton</u>	<u>Bu</u>
1----- Adelino	8.5	30	1,150	600	17	100
2----- Agua	7.0	24	900	600	15	90
3----- Agustin	---	---	---	---	10	---
6----- Anapra	7.0	22	1,000	550	14	90
7, 8, 9----- Anthony-Vinton	7.5	24	850	500	15	85
17----- Belen	5.5	18	650	---	---	---
20, 21----- Bluepoint	6.5	---	---	---	---	60
22, 23----- Brazito	6.5	---	---	---	---	60
24----- Brazito	6.5	20	850	500	12	70
35, 36----- Glendale	8.5	28	1,200	600	16	100
40----- Harkey	8.5	28	1,150	600	18	90
41----- Harkey	9.0	30	1,250	600	18	100
42----- Harkey	4.0	---	500	---	---	---
43----- Harkey	8.5	28	1,200	600	16	100
56, 57, 58----- Mimbres	8.5	30	1,150	600	17	100
66----- Pajarito	7.5	24	950	550	15	85



TABLE 4.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1----- Adelino	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
2----- Agua	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
3----- Agustin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight-----	Moderate: small stones.
4----- Akela	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Moderate: dusty.	Severe: small stones, thin layer.
5*: Akela-----  Rock outcrop.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.
6----- Anapra	Slight-----	Slight-----	Slight-----	Severe: erodes easily.	Slight.
7*: Anthony-----  Vinton-----	Moderate: small stones.	Slight-----	Slight-----	Slight-----	Slight.
8*: Anthony-----  Vinton-----	Moderate: small stones.	Slight-----	Slight-----	Severe: erodes easily.	Slight.
9*: Anthony-----  Vinton-----	Moderate: small stones.	Slight-----	Slight-----	Severe: erodes easily.	Slight.
10*: Aridic Argiustolls.  Goldust-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
11*: Aridic Haplustalfs.  Rock outcrop.					
12*: Arizo-----  Riverwash.	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13*: Arizo-----	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
Canutio-----	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones, droughty.
14----- Armijo	Severe: flooding.	Moderate: flooding, too clayey, percs slowly.	Severe: flooding.	Severe: erodes easily.	Severe: flooding, too clayey.
15----- Armijo	Severe: flooding, excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: flooding, excess sodium, excess salt.	Severe: erodes easily.	Severe: excess salt, excess sodium, flooding.
16*: Badland.					
Nickel-----	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
17----- Belen	Slight-----	Slight-----	Slight-----	Severe: erodes easily.	Slight.
18*, 19*: Berino-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Dona Ana-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
20----- Bluepoint	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
21----- Bluepoint	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: droughty, slope.
22----- Brazito	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
23----- Brazito	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
24----- Brazito	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: droughty.
25*: Caliza-----	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, droughty, slope.
Bluepoint-----	Severe: too sandy.	Severe: too sandy.	Severe: slope.	Severe: too sandy.	Moderate: droughty, slope.
Yturbide-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26*: Canutio-----	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight-----	Severe: small stones, droughty.
Pajarito-----	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight-----	Moderate: small stones, large stones.
27----- Cave	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, cemented pan.	Slight-----	Severe: thin layer.
28*: Courthouse-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
29*: Cruces-----	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight-----	Severe: thin layer.
Cacique-----	Slight-----	Slight-----	Moderate: cemented pan.	Slight-----	Moderate: thin layer.
30*: Delnorte-----	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: slope, small stones, cemented pan.	Severe: small stones.	Severe: small stones, thin layer.
Cave-----	Moderate: small stones.	Moderate: small stones.	Severe: cemented pan, small stones.	Moderate: small stones.	Severe: thin layer.
Tencee-----	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: small stones.	Severe: small stones.	Severe: small stones, thin layer.
31*: Dona Ana----- Loamy fine sand	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Dona Ana----- Very fine sandy loam	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
32*: Dona Ana-----	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
Tres Hermanos-----	Slight-----	Slight-----	Severe: small stones.	Slight-----	Moderate: small stones, droughty.
33----- Eba	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
34*: Elbutte-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight-----	Severe: thin layer.

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
34*: Courthouse-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight-----	Severe: thin layer.
35, 36----- Glendale	Slight-----	Slight-----	Slight-----	Severe: erodes easily.	Slight.
37*: Glendale-----	Severe: flooding.	Slight-----	Slight-----	Severe: erodes easily.	Slight.
Gila-----	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
38----- Goldust	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
39*: Goldust-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Pena-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
40----- Harkey	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
41----- Harkey	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
42----- Harkey	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: erodes easily.	Severe: excess salt, excess sodium.
43----- Harkey	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
44----- Holloman	Severe: depth to rock, excess salt.	Severe: excess salt, depth to rock.	Severe: depth to rock, excess salt.	Slight-----	Severe: excess salt, thin layer.
45----- Holloman Variant	Severe: flooding, depth to rock, excess salt.	Severe: excess salt, depth to rock.	Severe: depth to rock, excess salt.	Severe: erodes easily.	Severe: excess salt, thin layer.
46*: Ildefonso-----	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: small stones, slope.
Scholle-----	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: dusty.	Severe: small stones.
47----- La Fonda	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
48----- Largo	Severe: flooding.	Moderate: dusty.	Moderate: slope, flooding.	Severe: erodes easily.	Moderate: flooding.

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
49*: Largo-----	Severe: flooding.	Moderate: flooding, dusty.	Severe: flooding.	Severe: erodes easily.	Severe: flooding.
Sotim-----	Severe: flooding.	Slight-----	Moderate: slope, flooding.	Severe: erodes easily.	Moderate: flooding.
50*: Lehmans-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Luzena-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
51*. Lithic Haplargids					
52*: Lozier-----	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: small stones, slope, thin layer.
Rock outcrop.					
53*: Luzena-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
54----- Manzano	Severe: flooding.	Slight-----	Moderate: slope, flooding.	Slight-----	Moderate: flooding.
55----- Marconi	Severe: flooding.	Moderate: flooding, percs slowly.	Severe: flooding.	Severe: erodes easily.	Severe: flooding.
56----- Mimbres	Severe: flooding.	Moderate: dusty.	Moderate: slope, flooding.	Severe: erodes easily.	Moderate: flooding.
57----- Mimbres	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
58----- Mimbres	Severe: flooding.	Slight-----	Slight-----	Severe: erodes easily.	Slight.
59*: Minlith-----	Severe: too sandy, depth to rock.	Severe: too sandy, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: too sandy.	Severe: droughty, thin layer.
Rock outcrop.					
60----- Muzzler	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: small stones, slope, thin layer.

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
61*: Muzzler-----  Rock outcrop.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: small stones, slope, thin layer.
62----- Nickel	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
63*: Nickel-----  Chamberino-----	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
	Moderate: small stones, percs slowly, dusty.	Moderate: small stones, percs slowly, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones, droughty.
64*: Nickel-----  Tencee-----  Delnorte-----	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, thin layer.
	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: slope, small stones, cemented pan.	Severe: small stones.	Severe: small stones, thin layer.
65----- Pajarito	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
66----- Pajarito	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
67*: Pinaleno-----  Nolam-----	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, droughty.
	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight-----	Severe: small stones, droughty.
68*: Reakor-----  Dona Ana-----	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
69*: Redbank-----  Torrifluvents.	Severe: flooding.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
70*. Rock outcrop					

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
71*: Rock outcrop.					
Courthouse-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: dusty.	Severe: thin layer.
72*: Rock outcrop.					
Deama-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: large stones, slope, thin layer.
73*: Rock outcrop.					
Luzena-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
74*: Rock outcrop.					
Rizozo-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
75*: Rock outcrop.					
Torriorthents.					
76*: Scholle-----	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: dusty.	Severe: small stones.
Ildefonso-----	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: dusty.	Moderate: small stones, droughty, slope.
77----- Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight-----	Severe: thin layer.
78*: Stellar-----	Slight-----	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
Continental-----	Slight-----	Slight-----	Moderate: slope, small stones.	Slight-----	Slight.
79*: Thunderbird-----	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Moderate: dusty.	Moderate: thin layer.
Cabazon-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight-----	Severe: thin layer.

See footnote at end of table.



TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
80*: Torriorthents dissected.  Rock outcrop.					
81----- Tres Hermanos	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight-----	Moderate: small stones.
82*: Tres Hermanos-----	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight-----	Moderate: small stones.
Hap-----	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Severe: erodes easily.	Moderate: small stones.
83*. Urban land					
84*: Ustorthents dissected.					
Ildefonso-----	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
85----- Wink	Severe: flooding.	Moderate: dusty.	Moderate: slope, flooding.	Severe: erodes easily.	Moderate: flooding.
86*: Wink-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
Dona Ana-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 5.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
1----- Adelino	Good	Good	Good	---	Fair	Good	Good	Good	---	Good	Fair.
2----- Agua	Good	Good	Good	---	Good	Very poor.	Very poor.	Good	---	Very poor.	---
3----- Agustin	Fair	Good	Good	---	Good	Poor	Poor	Good	---	Poor	Good.
4----- Akela	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
5*: Akela----- Rock outcrop.	---	---	Poor	---	Poor	---	---	---	---	---	Poor.
6----- Anapra	Good	Good	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
7*, 8*, 9*: Anthony-----	Good	Good	Good	---	Good	Very poor.	Very poor.	Good	---	Very poor.	---
Vinton-----	Fair	Fair	Good	---	---	Very poor.	Very poor.	Fair	---	Very poor.	---
10*: Aridic Argiustolls.											
Goldust-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
11*: Aridic Haplustalfs. Rock outcrop.											
12*: Arizo----- Riverwash.	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
13*: Arizo----- Canutio-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
14----- Armijo	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
15----- Armijo	Poor	Fair	Very poor.	---	Very poor.	Fair	Good	Poor	---	Fair	Very poor.
16*: Badland.											

See footnote at end of table.



TABLE 5.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
16*: Nickel-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
17----- Belen	Good	Good	Poor	---	Poor	Good	Good	Fair	---	Good	Poor.
18*, 19*: Berino-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Dona Ana-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
20, 21----- Bluepoint	---	---	Poor	---	Poor	---	---	---	---	---	Poor.
22----- Brazito	Fair	Good	Poor	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
23----- Brazito	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
24----- Brazito	Fair	Good	Poor	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
25*: Caliza-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Bluepoint-----	---	---	Poor	---	Poor	---	---	---	---	---	Poor.
Yturbide-----	Very poor.	Poor	Poor	---	Very poor.	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
26*: Canutio-----	Very poor.	Very poor.	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Pajarito-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
27----- Cave	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
28*: Courthouse-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
29*: Cruces-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Cacique-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
30*: Delnorte-----	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Cave-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	---	---	Very poor.	Poor.
Tencee-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.

See footnote at end of table.



TABLE 5.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
31*: Dona Ana----- Loamy fine sand	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Dona Ana----- Very fine sandy loam	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
32*: Dona Ana-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Tres Hermanos-----	Very poor.	Very poor.	Poor	---	Fair	Poor	Very poor.	---	---	Very poor.	Fair.
33. Eba											
34*: Elbutte-----	Very poor.	Very poor.	Very poor.	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Courthouse-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
35, 36----- Glendale	Good	Good	Fair	---	Fair	Good	Fair	Good	---	Good	Good.
37*: Glendale-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	---	---	---	Poor.
Gila-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
38----- Goldust	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
39*: Goldust-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Pena-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
40, 41----- Harkey	Good	Good	Good	---	---	Fair	Fair	Good	---	Fair	Good.
42----- Harkey	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
43----- Harkey	Good	Good	Good	---	---	Fair	Fair	Good	---	Fair	Good.
44----- Holloman	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
45----- Holloman Variant	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Poor	Very poor.	---	Very poor.	Poor.
46*: Ildefonso-----	Poor	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.
Scholle-----	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.

See footnote at end of table.



TABLE 5.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
47----- La Fonda	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
48----- Largo	Poor	Poor	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
49*: Largo-----	Poor	Poor	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Sotim-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
50*: Lehmans-----	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Luzena-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
51*. Lithic Haplargids											
52*: Lozier-----	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rock outcrop.											
53*: Luzena-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	Poor	---	Fair.
Rock outcrop.											
54----- Manzano	Fair	Good	Good	---	Fair	Fair	Fair	Good	---	Fair	Fair.
55----- Marconi	Very poor.	Very poor.	Poor	---	Poor	Poor	Poor	Poor	---	Poor	Poor.
56----- Mimbres	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
57, 58----- Mimbres	Good	Good	Fair	---	Fair	Good	Good	Good	---	Good	Fair.
59*: Minlith-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rock outcrop.											
60----- Muzzler	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
61*: Muzzler-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
62----- Nickel	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.

See footnote at end of table.



TABLE 5.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
63*: Nickel-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Chamberino-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
64*: Nickel-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Tencee-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Delnorte-----	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
65----- Pajarito	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
66----- Pajarito	Good	Good	Poor	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
67*: Pinaleno-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Nolam-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
68*: Reakor-----	Very poor.	Very poor.	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Dona Ana-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
69*: Redbank-----	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
Torrifluvents.											
70*: Rock outcrop											
71*: Rock outcrop.											
Courthouse-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
72*: Rock outcrop.											
Deama.											
73*: Rock outcrop.											
Luzena-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	Poor	---	Fair.
74*: Rock outcrop.											

See footnote at end of table.



TABLE 5.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
74*: Rizozo-----	Very poor.	Very poor.	Poor	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
75*: Rock outcrop. Torriorthents.											
76*: Scholle-----	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Ildefonso-----	Poor	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.
77----- Simona	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
78*: Stellar-----	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Continental-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
79*: Thunderbird-----	Poor	Poor	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Cabazon-----	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	---	---	Very poor.	Fair.
80*: Torriorthents dissected. Rock outcrop.											
81. Tres Hermanos											
82*: Tres Hermanos. Hap-----	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
83*. Urban land											
84*: Ustorthents dissected. Ildefonso-----	Poor	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.
85----- Wink	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor.
86*: Wink-----	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Dona Ana-----	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 6.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1----- Adelino	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
2----- Agua	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
3----- Agustin	Slight-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: small stones.
4----- Akela	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
5*: Akela-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
6----- Anapra	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell.	Severe: low strength.	Slight.
7*, 8*, 9*: Anthony-----  Vinton-----	Slight-----  Severe: cutbanks cave.	Slight-----  Slight-----	Slight-----  Slight-----	Slight-----  Slight-----	Slight-----  Slight-----	Slight.  Moderate: droughty.
10*: Aridic Argiustolls.  Goldust-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11*: Aridic Haplustalfs.  Rock outcrop.						
12*: Arizo-----  Riverwash.	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones.
13*: Arizo-----  Canutio-----	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones.
14----- Armijo	Moderate: large stones, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, droughty.
15----- Armijo	Severe: cutbanks cave.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: flooding, too clayey.
	Severe: cutbanks cave.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: excess salt, excess sodium, flooding.

See footnote at end of table.



TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol.	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
16*: Badland.						
Nickel-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
17----- Belen	Moderate: too clayey.	Severe: shrink-swell.	Slight-----	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
18*: Berino-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
Dona Ana-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
19*: Berino-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
Dona Ana-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
20----- Bluepoint	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
21----- Bluepoint	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
22, 23----- Brazito	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
24----- Brazito	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
25*: Caliza-----	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
Bluepoint-----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Yturbide-----	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
26*: Canutio-----	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones, droughty.
Pajarito-----	Slight-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: small stones, large stones.
27----- Cave	Severe: cemented pan, cutbanks cave.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.

See footnote at end of table.



TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
28*: Courthouse-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
29*: Cruces-----  Cacique-----	Severe: cemented pan.  Severe: cemented pan.	Severe: cemented pan.  Moderate: cemented pan, shrink-swell.	Severe: cemented pan.  Severe: cemented pan.	Severe: cemented pan.  Moderate: cemented pan, shrink-swell.	Severe: cemented pan.  Moderate: cemented pan, shrink-swell.	Severe: thin layer.  Moderate: thin layer.
30*: Delnorte-----  Cave-----  Tencee-----	Severe: cemented pan.  Severe: cemented pan.  Severe: cemented pan.	Moderate: slope, cemented pan.  Severe: cemented pan.  Severe: cemented pan.	Severe: cemented pan.  Severe: cemented pan.  Severe: cemented pan.	Severe: slope.  Severe: cemented pan.  Severe: cemented pan.	Moderate: cemented pan, slope.  Severe: cemented pan.  Severe: cemented pan.	Severe: small stones, thin layer.  Severe: thin layer.  Severe: small stones, thin layer.
31*: Dona Ana----- Loamy fine sand  Dona Ana----- Very fine sandy loam	Slight-----  Slight-----	Moderate: shrink-swell.  Moderate: shrink-swell.	Moderate: shrink-swell.  Moderate: shrink-swell.	Moderate: shrink-swell.  Moderate: shrink-swell.	Moderate: shrink-swell.  Moderate: shrink-swell.	Slight.  Slight.
32*: Dona Ana-----  Tres Hermanos----	Slight-----  Slight-----	Moderate: shrink-swell.  Moderate: shrink-swell.	Moderate: shrink-swell.  Slight-----	Moderate: shrink-swell, slope.  Moderate: shrink-swell, slope.	Moderate: shrink-swell.  Moderate: low strength, shrink-swell.	Slight.  Moderate: small stones, droughty.
33----- Eba	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Severe: small stones.
34*: Elbutte-----  Courthouse-----	Severe: depth to rock.  Severe: depth to rock.	Moderate: slope, depth to rock.  Severe: depth to rock.	Severe: depth to rock.  Severe: depth to rock.	Severe: slope.  Severe: slope, depth to rock.	Moderate: depth to rock, slope.  Severe: depth to rock.	Severe: thin layer.  Severe: thin layer.
35, 36----- Glendale	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
37*: Glendale-----  Gila-----	Slight-----  Slight-----	Severe: flooding.  Severe: flooding.	Severe: flooding.  Severe: flooding.	Severe: flooding.  Severe: flooding.	Severe: low strength.  Moderate: flooding.	Slight.  Slight.
38----- Goldust	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.



TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
39*: Goldust-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pena-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
40, 41----- Harkey	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
42----- Harkey	Moderate: wetness.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Severe: excess salt, excess sodium.
43----- Harkey	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
44----- Holloman	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Severe: excess salt, thin layer.
45----- Holloman Variant	Severe: depth to rock.	Severe: flooding.	Severe: flooding, depth to rock.	Severe: flooding.	Moderate: depth to rock, flooding.	Severe: excess salt, thin layer.
46*: Ildefonso-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Scholle-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
47----- La Fonda	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
48----- Largo	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
49*: Largo-----	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Sotim-----	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
50*: Lehmans-----	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, thin layer.
Luzena-----	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, thin layer.
51*. Lithic Haplargids						
52*: Lozier-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, thin layer.
Rock outcrop.						

See footnote at end of table.



TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
53*: Luzena-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, thin layer.
54----- Manzano	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
55----- Marconi	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: flooding.
56----- Mimbres	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
57, 58----- Mimbres	Slight-----	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, shrink-swell.	Slight.
59*: Minlith-----  Rock outcrop.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: droughty, thin layer.
60----- Muzzler	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, thin layer.
61*: Muzzler-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, thin layer.
62----- Nickel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
63*: Nickel-----  Chamberino-----	Slight-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: small stones.
64*: Nickel-----  Tencee-----  Delnorte-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: slope, cemented pan.	Severe: cemented pan.	Severe: small stones, thin layer.
	Severe: cemented pan.	Moderate: slope, cemented pan.	Severe: cemented pan.	Severe: slope.	Moderate: cemented pan, slope.	Severe: small stones, thin layer.

See footnote at end of table.



TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
65, 66----- Pajarito	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
67*: Pinaleno-----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones, droughty.
Nolam-----	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: small stones, droughty.
68*: Reakor-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Dona Ana-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
69*: Redbank-----	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Torrifluvents.						
70*. Rock outcrop						
71*: Rock outcrop.						
Courthouse-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
72*: Rock outcrop.						
Deama-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, thin layer.
73*: Rock outcrop.						
Luzena-----	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, thin layer.
74*: Rock outcrop.						
Rizozo-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
75*: Rock outcrop.						
Torriorthents.						
76*: Scholle-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.

See footnote at end of table.



TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
76*: Ildefonso-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, droughty, slope.
77----- Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
78*: Stellar-----	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength.	Slight.
Continental-----	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
79*: Thunderbird-----	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
Cabazon-----	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength.	Severe: thin layer.
80*: Torriorthents dissected.  Rock outcrop.						
81----- Tres Hermanos	Slight-----	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: small stones.
82*: Tres Hermanos----	Slight-----	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: small stones.
Hap-----	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: small stones.
83*. Urban land						
84*: Ustorthents dissected.  Ildefonso-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
85----- Wink	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
86*: Wink-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
Dona Ana-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 7.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1----- Adelino	Moderate: percs slowly.	Severe: seepage.	Slight-----	Slight-----	Good.
2----- Agua	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
3----- Agustin	Slight-----	Severe: seepage.	Slight-----	Slight-----	Poor: small stones.
4----- Akela	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, seepage, small stones.
5*: Akela-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, seepage, small stones.
6----- Anapra	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: too sandy.	Slight-----	Poor: seepage, too sandy.
7*, 8*, 9*: Anthony-----	Slight-----	Severe: seepage.	Slight-----	Slight-----	Good.
Vinton-----	Slight-----	Severe: seepage.	Severe: too sandy.	Slight-----	Poor: too sandy.
10*: Aridic Argiustolls.  Goldust-----	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
11*: Aridic Haplustalfs.  Rock outcrop.					
12*: Arizo-----  Riverwash.	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: seepage, too sandy, small stones.
13*: Arizo-----	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: seepage, too sandy, small stones.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13*: Canutio-----	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, large stones.	Severe: flooding.	Poor: small stones.
14----- Armijo	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
15----- Armijo	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, excess sodium, excess salt.	Severe: flooding.	Poor: excess salt, excess sodium.
16*: Badland.					
Nickel-----	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
17----- Belen	Severe: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
18*, 19*: Berino-----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
Dona Ana-----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
20----- Bluepoint	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Slight-----	Fair: too sandy.
21----- Bluepoint	Severe: poor filter.	Severe: seepage, slope.	Moderate: slope, too sandy.	Moderate: slope.	Fair: too sandy, slope.
22, 23, 24----- Brazito	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight-----	Poor: seepage, too sandy.
25*: Caliza-----	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: seepage, too sandy, small stones.
Bluepoint-----	Severe: poor filter.	Severe: seepage, slope.	Moderate: slope, too sandy.	Moderate: slope.	Fair: too sandy, slope.
Yturbide-----	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: seepage, too sandy, slope.
26*: Canutio-----	Moderate: slope, large stones.	Severe: seepage, slope.	Severe: large stones.	Moderate: slope.	Poor: small stones.
Pajarito-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
27----- Cave	Severe: cemented pan.	Severe: seepage, cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim, small stones.
28*: Courthouse-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
29*: Cruces-----	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Cacique-----	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight-----	Poor: area reclaim, thin layer.
30*: Delnorte-----	Severe: cemented pan.	Severe: cemented pan, slope.	Moderate: cemented pan, slope.	Severe: cemented pan.	Poor: area reclaim, small stones.
Cave-----	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight-----	Poor: thin layer, area reclaim.
Tencee-----	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
31*: Dona Ana----- Loamy fine sand	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
Dona Ana----- Very fine sandy loam	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
32*: Dona Ana-----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
Tres Hermanos-----	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Poor: small stones.
33----- Eba	Severe: percs slowly.	Moderate: slope.	Slight-----	Slight-----	Poor: small stones.
34*: Elbutte-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Courthouse-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
35, 36----- Glendale	Severe: percs slowly.	Slight-----	Slight-----	Slight-----	Fair: thin layer.
37*: Glendale-----	Severe: percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Fair: thin layer.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
37*: Gila-----	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Fair: small stones.
38----- Goldust	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
39*: Goldust-----	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Pena-----	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
40, 41----- Harkey	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
42----- Harkey	Moderate: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Moderate: wetness.	Good.
43----- Harkey	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
44----- Holloman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
45----- Holloman Variant	Severe: depth to rock.	Severe: depth to rock, flooding.	Severe: depth to rock, wetness, excess salt.	Severe: depth to rock.	Poor: area reclaim.
46*: Ildefonso-----	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Scholle-----	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
47----- La Fonda	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
48----- Largo	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
49*: Largo-----	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Sotim-----	Severe: flooding, percs slowly.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Good.
50*: Lehmans-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
50*: Luzena-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
51*. Lithic Haplargids					
52*: Lozier-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
53*: Luzena-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
54----- Manzano	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
55----- Marconi	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey.
56----- Mimbres	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
57, 58----- Mimbres	Severe: percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
59*: Minlith-----	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, seepage, small stones.
Rock outcrop.					
60----- Muzzler	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
61*: Muzzler-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
Rock outcrop.					
62----- Nickel	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
63*: Nickel-----	Severe: percs slowly.	Moderate: slope.	Slight-----	Slight-----	Poor: seepage, small stones.
Chamberino-----	Severe: percs slowly,	Moderate: slope.	Slight-----	Slight-----	Poor: small stones.
64*: Nickel-----	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: seepage, small stones.
Tencee-----	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Delnorte-----	Severe: cemented pan.	Severe: cemented pan, slope.	Moderate: cemented pan, slope.	Severe: cemented pan.	Poor: area reclaim, small stones.
65, 66----- Pajarito	Slight-----	Severe: seepage.	Slight-----	Slight-----	Good.
67*: Pinaleno-----	Moderate-----	Severe: seepage, slope.	Moderate: too sandy, slope.	Moderate: slope.	Poor: seepage, small stones.
Nolam-----	Severe: poor filter.	Severe: seepage.	Slight-----	Slight-----	Poor: seepage, small stones.
68*: Reakor-----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
Dona Ana-----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
69*: Redbank-----	Moderate: flooding.	Severe: seepage, flooding.	Moderate: flooding.	Moderate: flooding.	Good.
Torrifluvents.					
70*. Rock outcrop					
71*: Rock outcrop.					
Courthouse-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
72*: Rock outcrop.					
Deama-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73*: Rock outcrop.					
Luzena-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
74*: Rock outcrop.					
Rizozo-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
75*: Rock outcrop.					
Torriorthents.					
76*: Scholle-----	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
Ildefonso-----	Moderate: slope.	Severe: seepage, slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
77----- Simona	Severe: cemented pan.	Severe: seepage, cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
78*: Stellar-----	Severe: percs slowly.	Moderate: slope.	Slight-----	Slight-----	Fair: small stones.
Continental-----	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Poor: hard to pack.
79*: Thunderbird-----	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Cabazon-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
80*: Torriorthents dissected.					
Rock outcrop.					
81----- Tres Hermanos	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Poor: small stones.
82*: Tres Hermanos-----	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Poor: small stones.

See footnote at end of table.



TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
82*: Hap-----	Moderate: percs slowly.	Severe: seepage.	Slight-----	Slight-----	Fair: small stones.
83*. Urban land					
84*: Ustorthents dissected.					
Ildefonso-----	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
85----- Wink	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Good.
86*: Wink-----	Slight-----	Severe: seepage.	Slight-----	Slight-----	Good.
Dona Ana-----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 8.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1----- Adelino	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
2----- Agua	Good-----	Probable-----	Probable-----	Poor: area reclaim.
3----- Agustin	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
4----- Akela	Poor: area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones.
5*: Akela-----	Poor: area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
6----- Anapra	Good-----	Probable-----	Improbable: too sandy.	Fair: too clayey, thin layer.
7*, 8*, 9*: Anthony-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Vinton-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
10*: Aridic Argiustolls.				
Goldust-----	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
11*: Aridic Haplustalfs.				
Rock outcrop.				
12*: Arizo-----	Good-----	Probable-----	Probable-----	Poor: small stones, area reclaim.
Riverwash.				
13*: Arizo-----	Good-----	Probable-----	Probable-----	Poor: small stones, area reclaim.
Canutio-----	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14----- Armijo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
15----- Armijo	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
16*: Badland.				
Nickel-----	Poor: slope.	Probable-----	Probable-----	Poor: small stones, area reclaim, slope.
17----- Belen	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
18*: Berino-----	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Dona Ana-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
19*: Berino-----	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Dona Ana-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
20----- Bluepoint	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
21----- Bluepoint	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
22, 23----- Brazito	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy.
24----- Brazito	Good-----	Probable-----	Improbable: too sandy.	Good.
25*: Caliza-----	Fair: slope.	Probable-----	Probable-----	Poor: small stones, area reclaim, slope.
Bluepoint-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Yturbide-----	Fair: slope.	Probable-----	Improbable: thin layer.	Poor: small stones, slope.
26*: Canutio-----	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Pajarito-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
27----- Cave	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
28*: Courthouse-----  Rock outcrop.	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
29*: Cruces-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Cacique-----	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, area reclaim.
30*: Delnorte-----	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Cave-----	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, thin layer.
Tencee-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
31*: Dona Ana----- Loamy fine sand	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Dona Ana----- Very fine sandy loam	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
32*: Dona Ana-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Tres Hermanos-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
33----- Eba	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
34*: Elbutte-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Courthouse-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
35----- Glendale	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
36----- Glendale	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
37*: Glendale-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Gila-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
38----- Goldust	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
39*: Goldust-----	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Pena-----	Fair: large stones, slope.	Improbable: small stones, large stones.	Improbable: large stones.	Poor: area reclaim, small stones, slope.
40, 41----- Harkey	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
42----- Harkey	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
43----- Harkey	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
44----- Holloman	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, excess salt.
45----- Holloman Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, excess salt.
46*: Ildefonso-----	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Scholle-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
47----- La Fonda	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
48----- Largo	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
49*: Largo-----	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Sotim-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
50*: Lehmans-----	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
Luzena-----	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
51*: Lithic Haplargids				
52*: Lozier-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
53*: Luzena-----	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				
54----- Manzano	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
55----- Marconi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
56----- Mimbres	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
57----- Mimbres	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
58----- Mimbres	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
59*: Minlith-----	Poor: area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, too sandy, small stones.
Rock outcrop.				
60----- Muzzler	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
61*: Muzzler-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
62----- Nickel	Poor: slope.	Probable-----	Probable-----	Poor: small stones, area reclaim, slope.
63*: Nickel-----	Good-----	Probable-----	Probable-----	Poor: small stones, area reclaim.
Chamberino-----	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
64*: Nickel-----	Good-----	Probable-----	Probable-----	Poor: small stones, area reclaim.
Tencee-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Delnorte-----	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
65----- Pajarito	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
66----- Pajarito	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
67*: Pinaleno-----	Good-----	Probable-----	Probable-----	Poor: small stones, area reclaim.
Nolam-----	Good-----	Probable-----	Probable-----	Poor: small stones, area reclaim.
68*: Reakor-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dona Ana-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
69*: Redbank-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
Torrifluvents.				
70*. Rock outcrop				
71*: Rock outcrop.				
Courthouse-----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
72*: Rock outcrop.				

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
72*: Deama-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
73*: Rock outcrop. Luzena-----	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
74*: Rock outcrop. Rizozo-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
75*: Rock outcrop. Torriorthents.				
76*: Scholle-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ildefonso-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
77----- Simona	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
78*: Stellar-----	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Continental-----	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
79*: Thunderbird-----	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Cabazon-----	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
80*: Torriorthents dissected. Rock outcrop.				
81----- Tres Hermanos	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.



TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
82*: Tres Hermanos-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Hap-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
83*. Urban land				.
84*: Ustorthents dissected.				
Ildefonso-----	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
85----- Wink	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
86*: Wink-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Dona Ana-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 9.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1----- Adelino	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable-----	Erodes easily, soil blowing.	Erodes easily.
2----- Agua	Severe: seepage.	Severe: seepage.	Deep to water	Favorable-----	Erodes easily, too sandy.	Erodes easily.
3----- Agustin	Severe: seepage.	Moderate: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Soil blowing---	Droughty.
4----- Akela	Severe: depth to rock.	Severe: seepage.	Deep to water	Droughty, soil blowing, depth to rock.	Depth to rock, soil blowing.	Droughty, depth to rock.
5*: Akela-----  Rock outcrop.	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
6----- Anapra	Severe: seepage.	Severe: seepage, piping.	Deep to water	Erodes easily, excess salt.	Erodes easily, too sandy.	Erodes easily.
7*: Anthony-----  Vinton-----	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing---	Soil blowing---	Favorable.
	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty-----	Too sandy, soil blowing.	Droughty.
8*, 9*: Anthony-----  Vinton-----	Severe: seepage.	Severe: piping.	Deep to water	Favorable-----	Favorable-----	Favorable.
	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty-----	Too sandy-----	Droughty.
10*: Aridic Argiustolls.  Goldust-----	Severe: slope.	Moderate: large stones.	Deep to water	Droughty, percs slowly.	Slope, large stones.	Large stones, slope, droughty.
11*: Aridic Haplustalfs.  Rock outcrop.						
12*: Arizo-----  Riverwash.	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, fast intake.	Too sandy-----	Droughty.
13*: Arizo-----	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy-----	Droughty.

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
13*: Canutio-----	Severe: seepage.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Large stones---	Large stones, droughty.
14----- Armijo	Slight-----	Slight-----	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
15----- Armijo	Slight-----	Severe: excess sodium, excess salt.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
16*: Badland.						
Nickel-----	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope-----	Slope, droughty.
17----- Belen	Moderate: seepage.	Severe: piping.	Deep to water	Percs slowly, erodes easily.	Erodes easily	Erodes easily, percs slowly.
18*: Berino-----	Moderate: seepage, slope.	Severe: piping.	Deep to water	Fast intake, slope.	Soil blowing---	Favorable.
Dona Ana-----	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Fast intake, soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
19*: Berino-----	Moderate: seepage, slope.	Severe: piping.	Deep to water	Fast intake, slope.	Soil blowing---	Favorable.
Dona Ana-----	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
20----- Bluepoint	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
21----- Bluepoint	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
22, 23----- Brazito	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
24----- Brazito	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
25*: Caliza-----	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope, droughty.
Bluepoint-----	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
Yturbide-----	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
26*: Canutio-----	Severe: seepage, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Pajarito-----	Severe: seepage.	Severe: piping.	Deep to water	Slope-----	Favorable-----	Favorable.
27----- Cave	Severe: seepage, cemented pan.	Severe: seepage.	Deep to water	Cemented pan, slope.	Cemented pan, too sandy.	Cemented pan.
28*: Courthouse-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
29*: Cruces-----	Severe: cemented pan.	Severe: piping.	Deep to water	Soil blowing, percs slowly.	Cemented pan, soil blowing, percs slowly.	Cemented pan, percs slowly.
Cacique-----	Moderate: seepage, cemented pan.	Severe: thin layer.	Cemented pan---	Rooting depth, soil blowing.	Cemented pan, soil blowing.	Erodes easily, cemented pan.
30*: Delnorte-----	Severe: cemented pan, slope.	Severe: thin layer.	Deep to water	Droughty, cemented pan, slope.	Slope, cemented pan.	Slope, droughty, cemented pan.
Cave-----	Severe: seepage, cemented pan.	Severe: seepage, excess salt.	Cemented pan, slope.	Slope, droughty, rooting depth.	Cemented pan---	Droughty, rooting depth.
Tencee-----	Severe: cemented pan.	Severe: thin layer.	Deep to water	Droughty, cemented pan.	Large stones, cemented pan.	Large stones, droughty.
31*: Dona Ana----- Loamy fine sand	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Fast intake, soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
Dona Ana----- Very fine sandy loam	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
32*: Dona Ana-----	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
Tres Hermanos----	Moderate: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable-----	Droughty.
33----- Eba	Moderate: slope.	Slight-----	Deep to water	Droughty, percs slowly, slope.	Favorable-----	Droughty, percs slowly.
34*: Elbutte-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Courthouse-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
35----- Glendale	Slight-----	Moderate: thin layer.	Deep to water	Favorable-----	Erodes easily, soil blowing.	Erodes easily.
36----- Glendale	Slight-----	Moderate: thin layer.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
37*: Glendale-----	Slight-----	Moderate: thin layer.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
Gila-----	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
38----- Goldust	Severe: slope.	Moderate: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones.	Large stones, slope, droughty.
39*: Goldust-----	Severe: slope.	Moderate: large stones.	Deep to water	Droughty, percs slowly.	Slope, large stones.	Large stones, slope, droughty.
Pena-----	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope.
40----- Harkey	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Erodes easily.
41----- Harkey	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
42----- Harkey	Moderate: seepage.	Severe: piping, excess sodium.	Deep to water	Droughty, excess sodium.	Erodes easily	Excess salt, excess sodium, erodes easily.
43----- Harkey	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
44----- Holloman	Severe: depth to rock.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock.	Depth to rock	Excess salt.
45----- Holloman Variant	Severe: depth to rock.	Severe: piping, excess salt.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Excess salt, erodes easily, depth to rock.
46*: Ildefonso-----	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Scholle-----	Severe: slope.	Severe: piping.	Deep to water	Slope-----	Slope-----	Slope.
47----- La Fonda	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
48----- Largo	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, flooding.	Erodes easily	Erodes easily.
49*: Largo-----	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, flooding.	Erodes easily	Erodes easily.
Sotim-----	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, flooding.	Erodes easily	Erodes easily.

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
50*: Lehmans-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Luzena-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
51*. Lithic Haplargids						
52*: Lozier-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
53*: Luzena-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope.
Rock outcrop.						
54----- Manzano	Slight-----	Severe: piping.	Deep to water	Flooding-----	Favorable-----	Favorable.
55----- Marconi	Slight-----	Slight-----	Deep to water	Percs slowly, erodes easily, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
56----- Mimbres	Moderate: seepage.	Moderate: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
57, 58----- Mimbres	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
59*: Minlith-----	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, fast intake, soil blowing.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
60----- Muzzler	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
61*: Muzzler-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Rock outcrop.						
62----- Nickel	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope-----	Slope, droughty.
63*: Nickel-----	Moderate: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable-----	Droughty.
Chamberino-----	Moderate: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Large stones.	Large stones, droughty.

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
64*: Nickel-----	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope-----	Slope, droughty.
Tencee-----	Severe: cemented pan, slope.	Severe: thin layer.	Deep to water	Droughty, cemented pan.	Slope, large stones, cemented pan.	Large stones, slope, droughty.
Delnorte-----	Severe: cemented pan, slope.	Severe: thin layer.	Deep to water	Droughty, cemented pan, slope.	Slope, cemented pan.	Slope, droughty, cemented pan.
65----- Pajarito	Severe: seepage.	Severe: piping.	Deep to water	Fast intake, soil blowing, slope.	Soil blowing---	Favorable.
66----- Pajarito	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing---	Soil blowing---	Favorable.
67*: Pinaleno-----	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope, droughty.
Nolam-----	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable-----	Droughty.
68*: Reakor-----	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Dona Ana-----	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
69*: Redbank-----	Severe: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily, soil blowing.	Erodes easily.
Torrifluvents.						
70*: Rock outcrop						
71*: Rock outcrop.						
Courthouse-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
72*: Rock outcrop.						
Deama-----	Severe: depth to rock, slope.	Moderate: large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
73*: Rock outcrop.						
Luzena-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope.
74*: Rock outcrop.						

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
74*: Rizozo-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
75*: Rock outcrop.  Torriorthents.						
76*: Scholle-----	Severe: slope.	Severe: piping.	Deep to water	Slope-----	Slope-----	Slope.
Ildefonso-----	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
77----- Simona	Severe: cemented pan.	Severe: piping.	Deep to water	Droughty, soil blowing, cemented pan.	Cemented pan, soil blowing.	Cemented pan.
78*: Stellar-----	Moderate: slope.	Severe: piping.	Deep to water	Peres slowly, slope.	Favorable-----	Peres slowly.
Continental-----	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Soil blowing, peres slowly, slope.	Soil blowing, peres slowly.	Peres slowly.
79*: Thunderbird-----	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Peres slowly, depth to rock, slope.	Depth to rock, peres slowly.	Depth to rock, peres slowly.
Cabazon-----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Peres slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
80*: Torriorthents dissected.  Rock outcrop.						
81----- Tres Hermanos	Moderate: seepage, slope.	Slight-----	Deep to water	Slope-----	Favorable-----	Favorable.
82*: Tres Hermanos----	Moderate: seepage, slope.	Slight-----	Deep to water	Slope-----	Favorable-----	Favorable.
Hap-----	Severe: seepage.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
83*. Urban land						
84*: Ustorthents dissected.						
Ildefonso-----	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

See footnote at end of table.



TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
85----- Wink	Severe: seepage.	Moderate: seepage, piping.	Deep to water	Flooding-----	Erodes easily	Erodes easily.
86*: Wink-----	Severe: seepage.	Slight-----	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing---	Droughty.
Dona Ana-----	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 10.--ENGINEERING INDEX PROPERTIES

[The symbol &lt; means less than; &gt; means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1----- Adelino	0-12	Loam-----	ML	A-4	0	100	100	90-100	50-60	20-25	NP-5
	12-30	Loam, sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	90-100	35-75	25-35	10-15
	30-60	Sandy loam, clay loam, loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	90-100	30-60	20-30	NP-10
2----- Agua	0-12	Loam-----	CL-ML	A-4	0	100	100	85-95	65-80	20-30	5-10
	12-33	Very fine sandy loam, loam, silt loam.	ML	A-4	0	100	90-100	80-90	55-75	20-30	NP-5
	33-60	Loamy fine sand, fine sand, sand.	SP-SM, SW-SM	A-1	0-5	75-85	75-85	35-50	5-10	---	NP
3----- Agustin	0-6	Gravelly sandy loam.	SM, SM-SC, GM, GM-GC	A-2-4, A-4	10-15	55-85	60-85	35-65	20-45	15-25	2-7
	6-60	Gravelly sandy loam, very gravelly sandy loam.	SM, SM-SC, GM, GM-GC	A-2-4, A-4	5-10	55-85	50-80	35-65	20-50	15-25	2-7
4----- Akela	0-3	Very gravelly loam.	GM	A-1, A-2	5-10	40-55	35-50	30-45	20-35	20-25	NP-5
	3-14	Gravelly loam, very gravelly loam.	GM	A-1, A-2	5-10	40-60	30-50	20-40	10-30	20-25	NP-5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5*: Akela-----	0-2	Cobbly loam-----	ML, CL-ML	A-4	15-25	85-95	80-90	70-85	50-70	25-35	5-10
	2-11	Very gravelly loam, extremely gravelly fine sandy loam.	GP-GM	A-1	0-5	30-40	20-30	5-15	5-10	15-20	NP-5
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
6----- Anapra	0-29	Clay loam-----	CL	A-6, A-7	0	100	100	95-100	70-85	40-50	20-30
	29-60	Stratified loamy sand and sand.	SM	A-2, A-4	0	100	95-100	65-80	10-40	---	NP
7*: Anthony-----	0-12	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	55-85	35-65	20-30	NP-5
	12-60	Fine sandy loam, loam, loamy fine sand.	SM	A-2, A-4	0	95-100	90-100	50-85	30-50	20-30	NP-5
Vinton-----	0-15	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	20-30	NP-5
	15-60	Loamy sand, loamy fine sand, fine sand.	SM	A-2	0	95-100	90-100	55-80	15-30	---	NP
8*: Anthony-----	0-17	Loam-----	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	25-35	5-15
	17-60	Fine sandy loam, loamy fine sand, sand.	SM	A-2, A-4	0	95-100	90-100	50-85	30-50	20-30	NP-5
Vinton-----	0-16	Loam-----	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-90	25-35	5-15
	16-60	Loamy sand, loamy fine sand, fine sand.	SM	A-2	0	95-100	90-100	55-80	15-30	---	NP

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>										
9*: Anthony-----	0-13	Clay loam-----	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	25-35	5-15
	13-60	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	95-100	90-100	50-85	30-50	20-30	NP-5
Vinton-----	0-13	Clay loam-----	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-90	25-35	5-15
	13-60	Loamy sand, loamy fine sand, fine sand.	SM	A-2	0	95-100	90-100	55-80	15-30	---	NP
10*: Aridic Argiustolls.											
Goldust-----	0-8	Gravelly clay loam.	GC, CL	A-6	10-15	70-90	60-85	50-70	40-60	30-40	10-20
	8-21	Very gravelly clay, very gravelly clay loam.	GC	A-2, A-6, A-7	15-25	55-70	45-60	35-55	30-50	30-50	15-30
	21-60	Very gravelly sandy clay loam, very gravelly clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-4, A-6	15-30	45-70	35-60	25-50	15-45	20-35	5-15
11*: Aridic Haplustalfs.											
Rock outcrop.											
12*: Arizo-----	0-60	Very gravelly loamy sand.	GP-GM	A-1	0-10	35-55	30-50	10-30	5-15	---	NP
Riverwash.											
13*: Arizo-----	0-4	Very gravelly sandy loam.	GP-GM, GM	A-1	0-10	35-55	30-50	15-35	5-25	---	NP
	4-60	Stratified very gravelly sand to loamy sand.	GP-GM, GP, SP, SP-SM	A-1	0-10	35-55	30-50	10-30	0-10	---	NP
Canutio-----	0-4	Very gravelly sandy loam.	GP-GC, GC, SC, GM-GC	A-1, A-2, A-4	15-20	30-65	30-60	15-50	10-40	22-40	5-15
	4-60	Gravelly sandy loam, very gravelly loam, very gravelly sandy loam.	GP-GC, SC, GC, GM-GC	A-1, A-2, A-4	10-30	35-75	35-70	15-60	5-40	22-40	5-15
14----- Armijo	0-60	Clay-----	CL, CH	A-7	0	100	100	95-100	85-95	45-70	25-45
15----- Armijo	0-60	Clay-----	CH, CL	A-7	0	100	100	95-100	90-100	45-70	20-45
16*: Badland.											
Nickel-----	0-2	Very gravelly fine sandy loam.	GM	A-1, A-2	0-10	35-55	30-50	15-45	10-35	---	NP
	2-60	Very gravelly sandy loam, very gravelly fine sandy loam, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-50	15-35	5-25	---	NP

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
17----- Belen	0-13 13-28 28-60	Clay loam----- Clay, silty clay, silty clay loam. Fine sandy loam, loam, silt loam.	CL CH, MH CL-ML, CL	A-6 A-7 A-4	0 0 0	100 100 100	100 100 100	95-100 95-100 75-95	85-90 90-100 50-85	30-40 50-70 20-30	15-25 20-40 5-10
18*: Berino-----	0-5 5-41 41-60	Loamy fine sand Sandy clay loam, sandy loam, loam. Sandy clay loam, sandy loam.	SM, SP-SM SC, SM-SC, CL, CL-ML SC, SM-SC, CL, CL-ML	A-2 A-6, A-4 A-6, A-4	0 0 0	95-100 95-100 95-100	95-100 95-100 95-100	50-95 65-80 65-80	10-35 35-60 35-55	--- 20-35 20-35	NP 5-15 5-15
Dona Ana-----	0-6 6-16 16-60	Loamy fine sand Sandy clay loam, sandy loam, loam. Sandy loam, sandy clay loam, fine sandy loam.	SM SC, SM-SC SM-SC, SC	A-2 A-6, A-4 A-2, A-4, A-6	0 0 0	95-100 95-100 95-100	90-100 90-100 90-100	50-80 80-90 60-80	15-35 35-50 30-50	--- 25-40 20-35	NP 5-15 5-15
19*: Berino-----	0-3 3-32 32-60	Loamy fine sand Sandy clay loam, sandy loam, loam. Sandy clay loam, loam.	SM, SP-SM SC, SM-SC, CL, CL-ML SC, SM-SC, CL, CL-ML	A-2 A-6, A-4 A-6, A-4	0 0 0	95-100 95-100 95-100	95-100 95-100 95-100	50-95 65-80 65-80	10-35 35-60 35-55	--- 20-35 20-35	NP 5-15 5-15
Dona Ana-----	0-3 3-17 17-60	Sandy loam----- Sandy clay loam, sandy loam, loam. Sandy loam, sandy clay loam, fine sandy loam.	SM, ML SC, SM-SC SM-SC, SC	A-2, A-4 A-6, A-4 A-2, A-4, A-6	0 0 0	95-100 95-100 95-100	90-100 90-100 90-100	60-85 80-90 60-80	30-50 35-50 30-50	15-25 25-40 20-35	NP-5 5-15 5-15
20----- Bluepoint	0-3 3-60	Loamy sand----- Loamy fine sand, loamy sand.	SM SM	A-2, A-4 A-2, A-4	0 0	100 100	100 100	65-85 65-85	25-45 25-45	--- ---	NP NP
21----- Bluepoint	0-10 10-60	Loamy fine sand Stratified fine sand to gravelly loamy fine sand.	SM SM	A-2, A-4 A-2	0 0	100 70-100	100 60-90	65-85 55-85	25-45 10-30	--- ---	NP NP
22----- Brazito	0-16 16-60	Loamy fine sand Fine sand, sand	SM SP, SP-SM	A-2 A-3	0 0	95-100 95-100	95-100 95-100	70-85 65-85	15-30 0-10	--- ---	NP NP
23----- Brazito	0-6 6-60	Loamy fine sand Fine sand, sand	SM SP, SP-SM	A-2 A-3	0 0	95-100 95-100	95-100 95-100	70-85 65-85	15-30 0-10	--- ---	NP NP
24----- Brazito	0-14 14-60	Very fine sandy loam. Fine sand, sand	SM SP, SP-SM	A-2, A-4 A-3	0 0	95-100 95-100	95-100 95-100	75-85 65-85	30-45 0-10	20-25 ---	NP-5 NP
25*: Caliza-----	0-12 12-60	Very gravelly sandy loam. Very gravelly loamy sand, very gravelly sand.	GM GP, GP-GM	A-1 A-1	0 0	30-50 25-50	25-45 25-40	20-35 10-30	10-20 0-10	20-25 ---	NP-5 NP
Bluepoint-----	0-10 10-60	Fine sand----- Loamy fine sand, loamy sand.	SM SM	A-2, A-4 A-2, A-4	0 0	100 100	100 100	75-85 65-85	25-40 25-45	--- ---	NP NP

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>										
25*: Yturbide-----	0-15	Gravelly loamy fine sand.	SM	A-1, A-2	0	65-80	60-75	35-55	15-25	---	NP
	15-60	Gravelly sand, gravelly loamy sand, gravelly loamy fine sand.	SP-SM, SM	A-1, A-2	0-5	60-80	55-75	30-60	5-25	---	NP
26*: Canutio-----	0-4	Very gravelly sandy loam.	GP-GC, GC, SC, GM-GC	A-1, A-2, A-4	5-20	30-65	30-60	15-50	10-40	22-40	5-15
	4-60	Extremely gravelly sandy loam, very gravelly loamy sand, very gravelly sandy loam.	GP-GC, SC, GC, GM-GC	A-1, A-2, A-4	15-25	30-65	20-60	15-55	5-40	22-40	5-15
Pajarito-----	0-4	Gravelly sandy loam.	SM, GM	A-7, A-2	0-5	50-75	50-75	30-50	20-30	15-20	NP-5
	4-60	Loam-----	ML	A-4	0	100	95-100	75-90	55-70	20-30	NP-5
27----- Cave	0-13	Gravelly fine sandy loam.	SM	A-2, A-4	0-5	70-90	60-75	40-65	25-40	20-25	NP-5
	13-60	Indurated-----	---	---	---	---	---	---	---	---	---
28*: Courthouse-----	0-2	Very cobbly very fine sandy loam.	SM	A-2	45-65	75-90	70-85	60-75	25-35	20-30	NP-5
	2-10	Gravelly fine sandy loam, gravelly loam, gravelly clay loam.	SM, SC	A-2, A-4, A-6	0-5	80-90	65-75	60-70	25-50	20-30	NP-15
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
29*: Cruces-----	0-1	Sandy loam-----	SM, ML, CL-ML, SM-SC	A-4	0	90-100	90-100	75-85	45-60	15-25	NP-5
	1-18	Fine sandy loam, sandy clay loam.	CL-ML, SM-SC, SC, CL	A-2, A-4	0	90-100	80-100	80-90	30-60	20-30	5-10
	18	Indurated-----	---	---	---	---	---	---	---	---	---
Cacique-----	0-2	Fine sandy loam	SM	A-2, A-4	0	100	100	60-85	30-50	15-25	NP-5
	2-24	Sandy clay loam, fine sandy loam.	SC	A-2, A-6	0	90-100	85-100	65-90	30-50	25-35	10-15
	24	Indurated-----	---	---	---	---	---	---	---	---	---
30*: Delnorte-----	0-14	Very gravelly fine sandy loam.	GC, GM-GC, SM-SC, SC	A-2, A-4, A-6, A-1-B	0-10	40-75	30-50	25-50	15-45	20-40	5-15
	14-26	Indurated-----	---	---	---	---	---	---	---	---	---
	26-60	Variable-----	---	---	---	---	---	---	---	---	---
Cave-----	0-12	Gravelly very fine sandy loam.	SM	A-2, A-4	0-5	70-90	60-75	50-65	25-40	20-25	NP-5
	12-26	Indurated-----	---	---	---	---	---	---	---	---	---
	26-60	Gravelly loamy sand, very gravelly sandy loam.	GM, SM	A-1, A-2	0-5	35-75	30-60	20-35	10-30	---	NP

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>										
30*: Tencee-----	0-2	Very gravelly fine sandy loam.	GM, GP-GM	A-1, A-2	0-25	35-50	35-45	15-40	10-35	20-30	NP-5
	2-16	Very gravelly sandy loam, very gravelly loam, very gravelly silt loam.	GM	A-1, A-2	0-25	35-50	35-45	15-40	10-35	20-30	NP-5
	16	Indurated-----	---	---	---	---	---	---	---	---	---
31*: Dona Ana----- Loamy fine sand	0-12	Loamy fine sand	SM	A-2	0	95-100	90-100	70-80	15-35	---	NP
	12-30	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	30-60	Sandy loam, sandy clay loam, fine sandy loam.	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	60-80	30-50	20-35	5-15
Dona Ana----- Very fine sandy loam	0-6	Very fine sandy loam.	SM, ML	A-2, A-4	0	95-100	90-100	75-85	30-50	15-25	NP-5
	6-22	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	22-60	Sandy loam, loam, fine sandy loam.	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	60-80	30-50	20-35	5-15
32*: Dona Ana-----	0-3	Very fine sandy loam.	SM, ML	A-2, A-4	0	95-100	90-100	75-85	30-50	15-25	NP-5
	3-18	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	18-60	Loam, sandy clay loam, fine sandy loam.	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	60-80	30-50	20-35	5-15
Tres Hermanos---	0-3	Gravelly fine sandy loam.	SM-SC, SM	A-2, A-4	0-5	70-90	60-75	50-70	30-50	20-30	NP-10
	3-26	Gravelly loam, gravelly sandy clay loam.	GC, CL, SC	A-6, A-7	0-5	65-80	60-75	50-65	35-55	30-45	10-20
	26-60	Gravelly loam, gravelly sandy clay loam, very gravelly sandy clay loam.	SM, GM	A-1, A-2, A-4	0-10	55-80	50-75	40-65	20-50	20-30	NP-5
33----- Eba	0-3	Very gravelly loam.	GM-GC	A-2, A-4, A-1	10-15	35-60	30-55	25-55	20-40	25-30	5-10
	3-21	Very gravelly clay, very gravelly clay loam.	GC	A-2, A-6, A-7	10-15	35-60	30-55	25-55	25-50	35-55	15-35
	21-60	Very gravelly clay loam.	GC	A-2, A-6	10-15	35-65	30-55	25-55	20-45	30-40	10-25
34*: Elbutte-----	0-3	Gravelly clay loam.	CL, GC	A-6	0-5	70-80	65-75	60-70	45-55	25-35	10-20
	3-10	Clay, clay loam	CL, CH	A-6, A-7	0-5	90-100	85-100	70-90	60-80	35-55	15-30
	10-14	Extremely shaly silty clay loam.	GM	A-2	0-10	25-50	10-25	10-25	5-25	35-50	10-20
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>										
34*: Courthouse-----	0-2	Gravelly fine sandy loam.	SM	A-2	5-10	80-90	65-80	60-70	25-35	20-30	NP-5
	2-8	Gravelly fine sandy loam, gravelly sandy clay loam, gravelly clay loam.	SM, SC	A-2, A-4, A-6	0-5	80-90	65-75	60-70	25-50	20-30	NP-15
	8-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
35----- Glendale	0-10	Loam-----	SM, ML	A-4	0	95-100	95-100	75-85	45-60	20-30	NP-5
	10-60	Silt loam, clay loam, silty clay loam.	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
36----- Glendale	0-12	Clay loam-----	CL	A-6	0	100	100	95-100	80-90	30-40	15-25
	12-60	Silt loam, clay loam, silty clay loam.	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
37*: Glendale-----	0-3	Silty clay loam	CL	A-6	0	100	100	95-100	80-90	30-40	15-25
	3-60	Silt loam, clay loam, silty clay loam.	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
Gila-----	0-8	Very fine sandy loam.	ML, CL-ML	A-4	0	95-100	95-100	80-90	60-75	20-30	NP-10
	8-60	Stratified silt loam to gravelly sandy loam.	ML, SM	A-4	0	80-100	70-100	50-80	40-65	20-30	NP-5
38----- Goldust	0-8	Very gravelly clay loam.	GC	A-2, A-6	10-25	50-60	40-50	35-45	30-40	30-40	10-20
	8-32	Very gravelly clay, gravelly clay.	GC	A-2, A-6, A-7	15-25	55-70	45-65	35-55	30-50	30-50	15-30
	32-60	Very gravelly sandy clay loam, very gravelly clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-4, A-6	15-30	45-70	35-60	25-50	15-45	20-35	5-15
39*: Goldust-----	0-6	Gravelly sandy clay loam.	GC, CL	A-6	10-15	70-90	60-85	50-70	40-60	30-40	10-20
	6-40	Very gravelly clay, very gravelly clay loam.	GC	A-2, A-6, A-7	15-25	55-70	45-60	35-55	30-50	30-50	15-30
	40-60	Very gravelly sandy clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-4, A-6	15-30	45-70	35-60	25-50	15-45	20-35	5-15
Pena-----	0-2	Gravelly sandy loam.	GM, GM-GC, SM, SM-SC	A-4	0-5	60-75	55-70	40-65	25-50	20-30	NP-10
	2-25	Very cobbly sandy clay loam, very gravelly clay loam, very gravelly loam.	GM	A-1, A-2, A-4	25-50	50-70	45-65	35-60	20-45	25-35	NP-10
	25-60	Extremely cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-1, A-2	5-75	35-55	30-50	30-50	20-35	20-30	NP-10

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
40----- Harkey	0-10 10-60	Fine sandy loam Very fine sandy loam, loam, silt loam.	SM ML	A-4 A-4	0 0	100 100	100 100	70-85 95-100	35-50 75-90	--- ---	NP NP
41----- Harkey	0-12 12-60	Loam----- Very fine sandy loam, loam, silt loam.	ML, CL-ML ML	A-4 A-4	0 0	100 100	100 100	95-100 95-100	65-90 75-90	25-30 ---	NP-10 NP
42----- Harkey	0-11 11-60	Loam----- Very fine sandy loam, loam, silt loam.	ML, CL-ML CL-ML, ML, CL	A-4 A-4	0 0.	100 100	100 100	90-100 95-100	65-90 75-90	20-30 ---	NP-10 NP
43----- Harkey	0-15 15-60	Clay loam----- Very fine sandy loam, loam, silt loam.	CL ML	A-6 A-4	0 0	100 100	100 100	95-100 95-100	75-90 75-90	30-40 ---	10-20 NP
44----- Holloman	0-10 10	Fine sandy loam Weathered bedrock	SM, ML ---	A-4 ---	0 ---	100 ---	100 ---	70-85 ---	40-55 ---	20-25 ---	NP-5 ---
45----- Holloman Variant	0-3 3-13 13	Clay loam----- Loam, very fine sandy loam. Weathered bedrock	CL CL-ML, CL, ML ---	A-4, A-6 A-4, A-6 ---	0 0 ---	100 100 ---	100 100 ---	90-100 85-95 ---	70-90 50-70 ---	25-40 15-25 ---	10-20 <15 ---
46*: Ildefonso-----	0-4 4-60	Very gravelly loam. Very gravelly loam, very gravelly fine sandy loam.	GM GM	A-1, A-2 A-1, A-2	0-5 15-25	45-60 40-65	35-50 35-60	30-45 25-50	15-35 10-40	20-25 20-25	NP-5 NP-5
Scholle-----	0-5 5-60	Very gravelly loam. Gravelly clay loam.	GC, GM-GC GC, CL	A-2, A-4, A-6 A-6	5-15 0	50-60 60-80	40-50 55-75	25-45 50-75	20-40 40-60	20-35 30-40	5-15 10-15
47----- La Fonda	0-4 4-60	Loam----- Loam, clay loam, silty clay loam.	CL-ML CL	A-4 A-6	0 0	100 95-100	100 95-100	85-95 85-95	60-75 60-85	20-30 25-35	5-10 10-15
48----- Largo	0-3 3-60	Very fine sandy loam. Silt loam, silty clay loam.	CL-ML, CL CL-ML, CL	A-4 A-4, A-6	0 0	100 100	100 100	95-100 95-100	70-90 80-95	20-30 25-35	5-10 5-15
49*: Largo-----	0-4 4-60	Silt loam----- Silt loam, slity clay loam.	CL-ML, CL CL-ML, CL	A-4 A-4, A-6	0 0	100 100	100 100	95-100 95-100	70-90 80-95	20-30 25-35	5-10 5-15
Sotim-----	0-3 3-60	Silty clay loam Clay loam, loam	CL-ML, CL CL-ML, CL	A-4, A-6 A-4, A-6	0 0	95-100 95-100	95-100 95-100	80-100 80-100	75-90 60-80	20-35 20-40	5-15 5-15
50*: Lehmans-----	0-3 3-12 12	Very stony clay loam. Stony clay loam, stony clay. Unweathered bedrock.	CL CL, CH ---	A-6 A-7 ---	35-50 15-25 ---	70-85 80-90 ---	65-80 75-85 ---	60-75 60-70 ---	50-60 50-60 ---	25-35 40-55 ---	10-15 20-35 ---

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
50*: Luzena-----	0-3	Cobbly loam-----	CL-ML	A-4	25-30	90-100	85-90	70-85	50-70	25-30	5-10
	3-14	Cobbly clay loam	CL, CH	A-7	5-20	70-100	65-80	55-80	50-75	45-55	20-30
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
51*. Lithic Haplargids											
52*: Lozier-----	0-9	Very stony loam--	GC, CL	A-2, A-4, A-6	25-30	40-70	35-65	25-60	20-55	25-40	5-15
	9-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
53*: Luzena-----	0-2	Gravelly loam----	SC, SM-SC, GC, GM-GC	A-4, A-6	0-15	65-80	60-75	60-70	40-50	25-40	5-20
	2-14	Gravelly clay, loam.	CL, CH	A-7	10-15	65-90	60-85	55-80	50-75	45-55	25-35
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
54----- Manzano	0-10	Loam-----	CL-ML, CL	A-4	0	100	100	85-100	60-90	20-30	5-10
	10-60	Loam, clay loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-85	25-40	5-15
55----- Marconi	0-4	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	30-45	10-20
	4-41	Clay, silty clay, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-100	35-50	20-35
	41-66	Clay loam, silty clay, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-100	30-45	10-20
56----- Mimbres	0-7	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	70-90	20-35	5-15
	7-26	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	25-45	10-25
	26-60	Sandy clay loam, silt loam, clay loam.	CL	A-6, A-7	0	90-100	90-100	90-100	40-95	30-45	10-25
57----- Mimbres	0-4	Silt loam-----	CL-ML	A-4	0	100	100	80-95	65-85	25-30	5-10
	4-40	Clay loam, silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-35	5-15
	40-60	Silt loam-----	CL-ML	A-4	0	90-100	90-100	80-95	65-85	25-30	5-10
58----- Mimbres	0-5	Clay loam-----	CL, CL-ML	A-6	0	100	100	90-100	75-90	30-35	10-15
	5-27	Clay loam, silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-35	5-15
	27-60	Clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-35	5-15
59*: Minlith-----	0-2	Gravelly loamy fine sand.	SP-SM, SM	A-1, A-2, A-3	0-10	70-85	65-75	50-60	5-25	---	NP
	2-8	Very gravelly loamy sand, very gravelly loamy fine sand.	GP-GM, GM, SP-SM, SM	A-1	5-25	45-60	40-50	20-40	5-15	---	NP
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
60----- Muzzler	0-2	Very gravelly loam.	GM-GC, GM	A-4	5-15	35-60	30-55	25-55	20-40	20-30	5-10
	2-13	Very gravelly clay loam, very gravelly clay.	GC	A-7	5-15	35-60	30-55	25-55	25-50	45-55	25-35
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
61*: Muzzler-----	0-6	Very gravelly sandy clay loam.	GM-GC, GM	A-4	5-15	35-60	30-55	25-55	20-40	20-30	5-10
	6-17	Very cobbly clay loam, very cobbly clay.	GC	A-7, A-2	25-30	40-70	35-65	50-55	25-50	45-55	25-35
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
62----- Nickel	0-12	Very gravelly fine sandy loam.	GM	A-1, A-2	0-5	25-55	25-50	15-45	10-35	---	NP
	12-60	Very gravelly sandy loam, very gravelly fine sandy loam, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-55	15-35	5-25	---	NP
63*: Nickel-----	0-12	Very gravelly fine sandy loam.	GM	A-1, A-2	0-5	25-55	25-50	15-45	10-35	---	NP
	12-24	Very gravelly sandy loam, very gravelly fine sandy loam, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-55	15-35	5-25	---	NP
	24-60	Extremely gravelly sandy loam, very gravelly fine sandy loam, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-10	25-40	20-35	15-35	5-25	---	NP
Chamberino-----	0-16	Gravelly loam----	SM, SM-SC	A-2, A-4, A-1	5-15	65-80	60-75	45-70	30-45	20-30	NP-10
	16-60	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	15-30	40-65	35-60	25-40	10-35	15-25	NP-5
64*: Nickel-----	0-13	Very gravelly fine sandy loam.	GM	A-1, A-2	0-5	25-55	25-50	20-45	10-35	---	NP
	13-22	Very gravelly sandy loam, very gravelly fine sandy loam, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-55	15-35	5-25	---	NP
	22-60	Very gravelly sandy loam, very gravelly fine sandy loam, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-50	15-35	5-25	---	NP

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>										
64*: Tencee-----	0-3	Very gravelly loam.	GM	A-1, A-2	10-25	40-60	35-55	25-40	20-35	20-30	NP-5
	3-12	Very gravelly sandy loam, very gravelly loam, very gravelly silt loam.	GM	A-1, A-2	0-20	35-50	30-45	15-40	10-35	20-30	NP-5
	12	Indurated-----	---	---	---	---	---	---	---	---	---
Delnorte-----	0-12	Very gravelly fine sandy loam.	GC, GM-GC,	A-2, A-4, A-6, A-1-B	0-10	40-60	30-50	25-45	15-40	20-40	5-15
	12-36	Indurated-----	---	---	---	---	---	---	---	---	---
	36-60	Variable-----	---	---	---	---	---	---	---	---	---
65----- Pajarito	0-5	Loamy sand-----	SM	A-2	0	100	100	85-90	25-35	---	NP
	5-18	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	90-100	85-100	60-100	25-45	15-20	NP-5
	18-60	Fine sandy loam, sandy loam, loam.	SM, ML	A-4, A-2	0	90-100	85-100	60-95	20-55	20-30	NP-5
66----- Pajarito	0-7	Fine sandy loam	SM	A-2, A-4	0	100	100	85-100	30-45	15-20	NP-5
	7-20	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	90-100	85-100	60-100	25-45	15-20	NP-5
	20-60	Fine sandy loam, sandy loam, loam.	SM, ML	A-4, A-2	0	90-100	85-100	60-95	20-55	20-30	NP-5
67*: Pinaleno-----	0-3	Very gravelly sandy loam.	GM	A-1	0-15	30-55	30-50	15-35	10-25	20-25	NP-5
	3-28	Very gravelly sandy loam, very gravelly sandy clay loam, very gravelly loam.	GM-GC	A-2	0-20	30-55	30-50	15-45	10-25	20-30	5-10
	28-60	Very gravelly sandy loam.	GP-GM	A-1	0-20	30-55	30-50	15-35	5-10	---	NP
Nolam-----	0-2	Very gravelly loam.	GM	A-1, A-2	0	35-50	35-50	30-40	20-35	20-25	NP-5
	2-17	Very gravelly sandy clay loam, very gravelly sandy loam, very gravelly loam.	GM-GC, GC, GP-GC	A-2, A-1	0	35-50	35-50	25-45	10-25	25-40	5-15
	17-60	Very gravelly sandy loam.	GM	A-1	0	35-50	35-50	20-35	10-20	20-25	NP-5
68*: Reakor-----	0-3	Silt loam-----	CL-ML	A-4	0	100	100	90-100	70-85	20-30	5-10
	3-60	Clay loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	75-95	25-35	5-20
Dona Ana-----	0-3	Fine sandy loam	SM, ML	A-2, A-4	0	95-100	90-100	60-85	30-50	15-25	NP-5
	3-21	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	21-60	Sandy loam, sandy clay loam, fine sandy loam.	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	60-80	30-50	20-35	5-15
69*: Redbank-----	0-10	Loam-----	ML, CL-ML	A-4	0	100	100	80-95	50-65	20-30	NP-10
	10-60	Very fine sandy loam, loam.	SM	A-2	0	100	100	80-95	35-50	---	NP
			SM, SM-SC								

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
69*: Torrifluvents.	In										
70*: Rock outcrop											
71*: Rock outcrop.											
Courthouse-----	0-2	Flaggy loam-----	SM	A-2	10-20	80-90	65-80	60-70	25-35	20-30	NP-5
	2-5	Flaggy sandy clay loam, gravelly sandy clay loam, gravelly clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	10-25	70-90	65-85	60-70	25-50	20-30	NP-15
	5-8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
72*: Rock outcrop.											
Deama-----	0-13	Very stony loam--	SM-SC	A-4	40-45	75-85	70-80	60-75	35-45	25-30	5-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
73*: Rock outcrop.											
Luzena-----	0-8	Gravelly clay loam.	SC, SM-SC, GC, GM-GC	A-4, A-6	10-15	70-85	60-80	55-70	40-50	25-40	5-20
	8-18	Gravelly clay, clay.	CL, CH	A-7	5-20	70-100	65-95	55-80	50-75	45-55	25-35
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
74*: Rock outcrop.											
Rizozo-----	0-6	Stony loam-----	SM-SC, CL-ML, ML	A-4	15-25	70-95	65-90	50-75	40-60	20-35	5-10
	6-10	Gravelly loam----	GM-GC, SM-SC	A-4	5-10	60-75	55-70	45-65	35-50	20-30	5-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
75*: Rock outcrop.											
Torriorthents.											
76*: Scholle-----	0-5	Very gravelly loam.	GC, GM-GC	A-2, A-4, A-6	5-15	50-60	40-50	25-45	20-40	20-35	5-15
	5-60	Gravelly clay loam.	GC, CL	A-6	0	60-80	55-75	50-75	40-60	30-40	10-15
Ildefonso-----	0-14	Gravelly loam----	GM, SM	A-1, A-2	0-5	50-75	50-60	30-60	25-40	20-25	NP-5
	14-60	Very gravelly loam, very gravelly fine sandy loam.	GM	A-1, A-2	15-25	40-65	35-60	25-50	10-40	20-25	NP-5
77----- Simona	0-4	Loamy fine sand	SM	A-2	0	100	100	90-100	15-35	---	NP
	4-15	Fine sandy loam, sandy loam, gravelly fine sandy loam.	SM	A-2, A-4	0-5	70-100	65-100	50-100	20-50	20-25	NP-5
	15	Indurated-----	---	---	---	---	---	---	---	---	---

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
78*: Stellar-----	In										
	0-2	Loam-----		A-6, A-4	0	100	100	85-95	50-60	25-35	5-15
	2-38	Clay, sandy clay, clay loam.	CL-ML, CL CH, CL, SC	A-7	0	100	100	80-95	45-90	40-60	15-30
	38-60	Clay loam, sandy clay loam, gravelly clay loam.	CL, GC, CL-ML, GM-GC	A-6, A-7, A-4	0-5	65-100	60-100	55-100	45-70	30-50	5-20
Continental-----	0-4	Fine sandy loam	SM, ML	A-4	0	95-100	85-100	60-80	40-60	20-30	NP-5
	4-30	Clay, clay loam	CL, CH	A-6, A-7	0	100	100	80-95	60-90	40-55	15-30
	30-60	Sandy clay loam	SC, CL	A-6	0	100	85-100	65-85	35-60	30-40	10-25
79*: Thunderbird-----	0-2	Loam-----	CL-ML	A-4	0-5	90-100	85-100	80-90	55-75	20-30	10-15
	2-26	Clay loam, gravelly clay.	CL, CH	A-7	5-10	95-100	70-95	80-90	60-85	40-60	25-35
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cabazon-----	0-4	Gravelly clay loam.	SC, GC	A-6	10-15	65-90	60-85	40-60	35-50	30-40	15-25
	4-16	Gravelly clay loam.	CL, CH	A-7	10-15	65-90	60-85	55-80	50-70	40-60	25-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
80*: Torriorthents dissected.  Rock outcrop.											
81----- Tres Hermanos	0-4	Gravelly fine sandy loam.	GC, SC, GM-GC, SM-SC	A-4, A-6, A-2	0-5	55-80	50-75	45-70	25-50	25-35	5-15
	4-14	Gravelly loam, gravelly sandy clay loam.	CL-ML, CL, GC, GM-GC	A-4, A-6	0-5	55-80	50-75	45-70	35-55	25-35	5-15
	14-60	Gravelly loam, extremely gravelly sandy loam.	SM-SC, GM-GC	A-4, A-2	10-20	35-70	30-65	25-60	20-50	25-30	5-10
82*: Tres Hermanos---	0-3	Gravelly loam---	GC, SC, GM-GC, SM-SC	A-4, A-6, A-2	0-5	55-80	50-75	45-70	25-50	25-35	5-15
	3-16	Gravelly loam, gravelly clay loam, clay loam.	CL-ML, CL, GC, GM-GC	A-4, A-6	0-5	55-80	50-75	45-70	35-55	25-35	5-15
	16-60	Extremely gravelly loam, extremely gravelly sandy loam.	GM-GC	A-2	15-30	20-35	15-30	15-30	10-30	25-30	5-10
Hap-----	0-5	Very gravelly loam.	GM-GC	A-2	0	30-55	25-50	20-40	15-35	25-30	5-10
	5-24	Gravelly sandy clay loam.	SC	A-6, A-2	0	95-100	50-75	40-70	20-40	30-35	10-15
	24-60	Very gravelly sandy clay loam.		A-2, A-1	0	30-55	25-50	20-40	15-30	20-25	NP-5

See footnote at end of table.



TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
83*. Urban land											
84*: Ustorthents dissected.											
Ildefonso-----	0-10	Very gravelly sandy loam.	GM	A-1, A-2	0-5	45-60	35-50	30-45	20-35	20-25	NP-5
	10-60	Very gravelly loam, very gravelly fine sandy loam.	GM	A-1, A-2	10-25	40-65	35-55	25-50	10-40	20-25	NP-5
85-----	0-4	Silt loam-----	CL-ML, CL	A-4	0	95-100	90-100	80-90	50-75	25-30	5-10
Wink	4-31	Sandy loam-----	SM, ML	A-4	0	90-100	90-100	50-80	35-60	20-30	NP-5
	31-60	Sandy loam-----	SM	A-2, A-4	0	85-100	75-90	50-65	25-40	15-25	NP-5
86*: Wink-----	0-2	Loamy fine sand	SM, SM-SC	A-2-4	0-5	90-100	90-100	80-100	15-35	<25	NP-6
	2-20	Fine sandy loam, loam.	SM, SM-SC	A-2-4, A-4	0-5	90-100	90-100	80-100	25-45	17-25	3-7
	20-60	Gravelly sandy loam.	GM, SM	A-1, A-2	0	55-80	50-75	40-55	20-35	15-25	NP-5
Dona Ana-----	0-3	Fine sandy loam	SM, ML	A-2, A-4	0	95-100	90-100	60-85	30-50	15-25	NP-5
	3-17	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	17-60	Sandy loam, sandy clay loam, fine sandy loam.	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	60-80	30-50	20-35	5-15

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
1----- Adelino	0-12 12-30 30-60	10-20 20-35 15-30	0.6-2.0 0.6-2.0 0.6-2.0	0.13-0.15 0.14-0.18 0.11-0.16	7.9-8.4 7.9-9.0 7.9-9.0	<2 <2 <2	Low----- Moderate Low-----	0.37 0.37 0.32	5	4L	.4-.8
2----- Agua	0-12 12-33 33-60	15-25 10-18 0-8	0.6-2.0 0.6-2.0 6.0-20	0.18-0.20 0.17-0.20 0.05-0.10	7.4-8.4 7.9-8.4 7.9-8.4	<4 <4 <2	Low----- Low----- Low-----	0.37 0.43 0.17	5	4L	.5-1
3----- Agustin	0-6 6-60	10-18 10-18	2.0-6.0 2.0-6.0	0.05-0.10 0.05-0.10	7.9-8.4 7.9-8.4	<2 <2	Low----- Low-----	0.15 0.15	3	4	<1
4----- Akela	0-3 3-14 14	15-20 10-20 ---	0.6-2.0 0.6-2.0 ---	0.07-0.09 0.05-0.10 ---	7.4-8.4 7.4-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.10 0.10 ---	1	6	1-3
5*: Akela-----	0-2 2-11 11	18-27 6-10 ---	0.6-2.0 0.6-2.0 ---	0.12-0.14 0.04-0.09 ---	7.4-8.4 7.4-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.20 0.10 ---	1	8	.5-1
Rock outcrop.											
6----- Anapra	0-29 29-60	27-35 3-10	0.2-0.6 6.0-20	0.15-0.18 0.03-0.08	7.9-8.4 7.9-8.4	2-4 2-8	Moderate Low-----	0.32 0.17	5	4L	<1
7*: Anthony-----	0-12 12-60	5-20 5-18	2.0-6.0 2.0-6.0	0.11-0.14 0.10-0.13	7.4-8.4 7.4-8.4	<4 <4	Low----- Low-----	0.28 0.28	5	3	.2-.6
Vinton-----	0-15 15-60	5-20 0-10	2.0-6.0 2.0-6.0	0.13-0.15 0.06-0.10	7.4-8.4 7.4-8.4	<2 <2	Low----- Low-----	0.28 0.20	5	3	.3-.6
8*: Anthony-----	0-17 17-60	15-27 5-18	0.6-2.0 2.0-6.0	0.16-0.20 0.06-0.13	7.4-8.4 7.4-8.4	<4 <4	Moderate Low-----	0.37 0.24	5	4L	.5-.8
Vinton-----	0-16 16-60	15-27 0-10	0.6-2.0 2.0-6.0	0.16-0.21 0.06-0.10	7.4-8.4 7.4-8.4	<2 <2	Moderate Low-----	0.37 0.17	5	4L	.5-.8
9*: Anthony-----	0-13 13-60	27-30 5-18	0.6-2.0 2.0-6.0	0.16-0.20 0.10-0.13	7.4-8.4 7.4-8.4	<4 <4	Moderate Low-----	0.32 0.28	5	4L	.5-.8
Vinton-----	0-13 13-60	27-30 0-10	0.6-2.0 2.0-6.0	0.16-0.21 0.06-0.10	7.4-8.4 7.4-8.4	<2 <2	Moderate Low-----	0.32 0.17	5	4L	.5-.8
10*: Aridic Argiustolls.											
Goldust-----	0-8 8-21 21-60	27-35 35-55 24-35	0.2-0.6 0.06-0.2 0.6-2.0	0.14-0.16 0.08-0.11 0.07-0.10	6.6-7.3 6.6-7.8 7.9-8.4	<2 <2 <2	Moderate Moderate Low-----	0.15 0.10 0.10	3	8	1-3
11*: Aridic Haplustalfs.											
Rock outcrop.											
12*: Arizo-----	0-60	1-8	>20	0.04-0.06	7.4-8.4	<2	Low-----	0.05	3	3	<.5

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
12*: Riverwash.											
13*: Arizo-----	0-4	3-10	6.0-20	0.05-0.07	7.4-8.4	<2	Low-----	0.10	3	4L	<.5
	4-60	1-8	>20	0.04-0.06	7.4-8.4	<2	Low-----	0.05			
Canutio-----	0-4	8-18	2.0-6.0	0.04-0.08	7.9-8.4	<2	Low-----	0.10	3	4L	<1
	4-60	8-18	2.0-6.0	0.04-0.08	7.9-8.4	<2	Low-----	0.10			
14----- Armijo	0-60	40-50	0.06-0.2	0.13-0.17	7.4-8.4	2-4	High-----	0.20	5	4	.7-1
15----- Armijo	0-60	40-50	<0.06	0.05-0.07	>8.4	>4	High-----	0.20	5	4	.7-.9
16*: Badland.											
Nickel-----	0-2	5-15	2.0-6.0	0.07-0.09	7.4-8.4	<2	Low-----	0.10	3	4L	<.5
	2-60	5-10	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low-----	0.10			
17----- Belen	0-13	28-40	0.06-0.2	0.19-0.21	7.9-9.0	<4	Moderate	0.32	5	4L	.7-1
	13-28	40-50	0.06-0.2	0.14-0.16	7.9-9.0	<4	High-----	0.32			
	28-60	10-20	0.6-2.0	0.13-0.15	7.9-9.0	<4	Low-----	0.37			
18*: Berino-----	0-5	5-10	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-----	0.20	5	2	.3-.6
	5-41	18-35	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Moderate	0.32			
	41-60	18-35	0.6-2.0	0.10-0.15	7.9-8.4	2-4	Moderate	0.32			
Dona Ana-----	0-6	0-10	2.0-6.0	0.08-0.10	7.4-8.4	<2	Low-----	0.20	5	2	.2-.5
	6-16	18-35	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32			
	16-60	15-25	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.28			
19*: Berino-----	0-3	5-10	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-----	0.20	5	2	.3-.6
	3-32	18-35	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Moderate	0.32			
	32-60	18-35	0.6-2.0	0.10-0.15	7.9-9.0	2-4	Moderate	0.37			
Dona Ana-----	0-3	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-----	0.24	5	3	.2-.5
	3-17	18-35	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32			
	17-60	15-25	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.28			
20----- Bluepoint	0-3	2-6	6.0-20	0.06-0.10	7.4-8.4	<2	Low-----	0.17	5	2	<.5
	3-60	2-6	6.0-20	0.05-0.09	7.9-8.4	<4	Low-----	0.20			
21----- Bluepoint	0-10	2-6	6.0-20	0.06-0.10	7.4-8.4	<2	Low-----	0.20	5	2	<.5
	10-60	2-6	6.0-20	0.05-0.08	7.9-8.4	<4	Low-----	0.15			
22----- Brazito	0-16	0-10	6.0-20	0.06-0.10	7.4-8.4	<4	Low-----	0.20	5	2	.3-.6
	16-60	0-6	6.0-20	0.04-0.06	7.4-8.4	<2	Low-----	0.15			
23----- Brazito	0-6	0-10	6.0-20	0.06-0.10	7.4-8.4	<4	Low-----	0.20	5	2	.3-.6
	6-60	0-6	6.0-20	0.04-0.06	7.4-8.4	<2	Low-----	0.15			
24----- Brazito	0-14	10-20	2.0-6.0	0.11-0.14	7.4-8.4	<4	Low-----	0.55	5	3	.4-.8
	14-60	0-6	6.0-20	0.04-0.06	7.4-8.4	<2	Low-----	0.15			
25*: Caliza-----	0-12	15-20	2.0-6.0	0.05-0.07	7.9-8.4	<2	Low-----	0.10	3	4L	.5-.7
	12-60	0-15	6.0-20	0.03-0.05	7.9-8.4	2-4	Low-----	0.05			
Bluepoint-----	0-10	2-6	6.0-20	0.06-0.10	7.4-8.4	<2	Low-----	0.17	5	1	<.5
	10-60	2-6	6.0-20	0.05-0.09	7.9-8.4	<4	Low-----	0.20			

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
25*: Yturbide-----	0-15 15-60	3-10 3-10	6.0-20 6.0-20	0.04-0.06 0.04-0.06	6.6-8.4 6.6-8.4	<2 <2	Low----- Low-----	0.10 0.10	4	2	.3-.5
26*: Canutio-----	0-4 4-60	8-18 8-18	2.0-6.0 2.0-6.0	0.04-0.08 0.04-0.08	7.9-8.4 7.9-8.4	<2 <2	Low----- Low-----	0.10 0.10	2	4L	<1
Pajarito-----	0-4 4-60	7-18 10-18	2.0-6.0 2.0-6.0	0.09-0.11 0.16-0.18	7.4-8.4 7.9-8.4	<4 <4	Low----- Low-----	0.15 0.37	5	4	.4-.7
27----- Cave	0-13 13-60	10-20 ---	0.6-2.0 ---	0.07-0.12 ---	7.9-8.4 ---	2-4 ---	Low----- ---	0.15 ---	1	4	<.5
28*: Courthouse-----	0-2 2-10 10	15-20 15-30 ---	0.6-2.0 0.6-2.0 ---	0.10-0.13 0.10-0.13 ---	7.9-8.4 7.9-8.4 ---	<2 <2 ---	Low----- Low----- ---	0.17 0.17 ---	1	8	.5-1
Rock outcrop.											
29*: Cruces-----	0-1 1-18 18	15-20 15-30 ---	2.0-6.0 0.6-2.0 ---	0.11-0.13 0.13-0.16 ---	6.6-7.8 7.4-8.4 ---	<2 <2 ---	Low----- Low----- ---	0.24 0.32 ---	1	3	---
Cacique-----	0-2 2-24 24	10-15 18-30 ---	2.0-6.0 0.6-2.0 ---	0.11-0.15 0.14-0.16 ---	6.6-7.8 7.4-8.4 ---	<2 <2 ---	Low----- Moderate ---	0.28 0.32 ---	2	3	---
30*: Delnorte-----	0-14 14-26 26-60	15-20 --- ---	0.6-2.0 --- ---	0.06-0.12 --- ---	7.9-8.4 --- ---	<2 --- ---	Low----- --- ---	0.10 --- ---	1	4L	---
Cave-----	0-12 12-26 26-60	8-14 --- 2-5	0.6-2.0 --- 2.0-6.0	0.07-0.12 --- 0.04-0.06	7.9-8.4 --- 7.9-8.4	2-4 --- 2-4	Low----- --- Low-----	0.28 --- 0.10	1	4	.5-1
Tencee-----	0-2 2-16 16	10-20 10-20 ---	0.6-2.0 0.6-2.0 ---	0.05-0.07 0.05-0.07 ---	7.9-8.4 7.9-8.4 ---	<2 <2 ---	Low----- Low----- ---	0.10 0.10 ---	1	4L	.5-1
31*: Dona Ana----- Loamy fine sand	0-12 12-30 30-60	0-10 18-35 15-25	2.0-6.0 0.6-2.0 0.6-2.0	0.08-0.10 0.13-0.17 0.13-0.17	7.4-8.4 7.9-8.4 7.9-8.4	<2 2-4 2-4	Low----- Moderate Moderate	0.20 0.32 0.28	5	2	.2-.5
Dona Ana----- Very fine sandy loam	0-6 6-22 22-60	5-15 18-35 15-25	2.0-6.0 0.6-2.0 0.6-2.0	0.10-0.13 0.13-0.17 0.13-0.17	7.4-8.4 7.9-8.4 7.9-8.4	<2 2-4 2-4	Low----- Moderate Moderate	0.55 0.32 0.32	5	3	.2-.5
32*: Dona Ana-----	0-3 3-18 18-60	5-15 18-35 15-25	2.0-6.0 0.6-2.0 0.6-2.0	0.10-0.13 0.13-0.17 0.13-0.17	7.4-8.4 7.9-8.4 7.9-8.4	<2 2-4 2-4	Low----- Moderate Moderate	0.55 0.32 0.32	5	3	.2-.5
Tres Hermanos---	0-3 3-26 26-60	10-20 20-30 15-25	0.6-2.0 0.2-0.6 0.6-2.0	0.10-0.17 0.10-0.15 0.07-0.10	7.4-8.4 7.4-8.4 7.9-8.4	<2 2-4 2-4	Low----- Moderate Low-----	0.15 0.20 0.15	3	4	.5-1
33----- Eba	0-3 3-21 21-60	8-18 35-60 28-40	0.6-2.0 0.06-0.2 0.2-0.6	0.07-0.09 0.07-0.09 0.07-0.09	6.6-7.8 7.4-8.4 7.9-8.4	<2 <4 <4	Low----- Moderate Moderate	0.10 0.10 0.10	3	8	<.6

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm		K	T		Pct
34*:											
Elbutte-----	0-3	27-35	0.2-0.6	0.14-0.16	7.4-8.4	2-4	Moderate	0.15	1	7	.5-1
	3-10	35-60	0.06-0.2	0.16-0.19	7.4-8.4	2-4	High-----	0.32			
	10-14	30-40	0.06-0.2	0.05-0.07	7.4-8.4	2-4	Moderate	0.05			
	14	---	---	---	---	---	---	---			
Courthouse-----	0-2	15-20	0.6-2.0	0.10-0.13	7.9-8.4	<2	Low-----	0.15	1	4	.5-1
	2-8	15-30	0.6-2.0	0.10-0.13	7.9-8.4	<2	Low-----	0.15			
	8-16	---	---	---	---	---	---	---			
35-----	0-10	15-25	0.6-2.0	0.13-0.15	7.9-8.4	2-4	Low-----	0.37	5	4L	.5-1
Glendale	10-60	25-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	0.37			
36-----	0-12	27-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	0.32	5	4L	.5-1
Glendale	12-60	25-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	0.37			
37*:											
Glendale-----	0-3	27-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	0.37	5	4L	.5-1
	3-60	25-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	0.37			
Gila-----	0-8	12-18	0.6-2.0	0.16-0.18	7.9-8.4	<4	Low-----	0.55	5	3	.5-1
	8-60	8-18	0.6-2.0	0.10-0.15	7.9-8.4	<4	Low-----	0.32			
38-----	0-8	27-40	0.2-0.6	0.10-0.13	6.6-7.3	<2	Moderate	0.10	3	8	1-3
Goldust	8-32	35-55	0.06-0.2	0.08-0.11	6.6-7.8	<2	Moderate	0.10			
	32-60	24-35	0.6-2.0	0.07-0.10	7.9-8.4	<2	Low-----	0.10			
39*:											
Goldust-----	0-6	25-35	0.2-0.6	0.14-0.16	6.6-7.3	<2	Moderate	0.15	3	6	1-3
	6-40	35-55	0.06-0.2	0.08-0.11	6.6-7.8	<2	Moderate	0.05			
	40-60	24-35	0.6-2.0	0.07-0.10	7.9-8.4	<2	Low-----	0.10			
Pena-----	0-2	7-20	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low-----	0.15	3	4	1-2
	2-25	10-30	0.6-2.0	0.05-0.08	7.9-8.4	2-4	Low-----	0.10			
	25-60	7-27	0.6-2.0	0.03-0.08	7.9-8.4	2-4	Low-----	0.05			
40-----	0-10	15-20	0.6-6.0	0.08-0.12	7.4-8.4	<4	Low-----	0.28	5	3	.6-1
Harkey	10-60	10-18	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low-----	0.49			
41-----	0-12	15-27	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low-----	0.37	5	4L	.7-1
Harkey	12-60	10-18	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low-----	0.49			
42-----	0-11	15-27	0.6-2.0	0.07-0.13	8.5-9.0	>4	Low-----	0.37	5	4L	.7-1
Harkey	11-60	10-18	0.6-2.0	0.07-0.13	8.5-9.0	4-16	Low-----	0.49			
43-----	0-15	27-38	0.2-0.6	0.15-0.19	7.4-8.4	<4	Moderate	0.32	5	4L	.8-1
Harkey	15-60	10-18	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low-----	0.49			
44-----	0-10	10-15	0.6-2.0	0.13-0.15	7.4-8.4	4-16	Low-----	0.28	1	3	.5-.9
Holloman	10	---	---	---	---	---	---	---			
45-----	0-3	28-35	0.06-0.2	0.08-0.10	7.4-9.0	>16	Moderate	0.32	1	6	.5-1
Holloman Variant	3-13	5-15	0.6-2.0	0.12-0.14	7.4-9.0	4-16	Low-----	0.49			
	13	---	---	---	---	---	---	---			
46*:											
Ildefonso-----	0-4	8-17	2.0-6.0	0.06-0.08	7.4-8.4	<4	Low-----	0.10	3	6	.5-1
	4-60	8-17	2.0-6.0	0.06-0.08	7.4-8.4	<4	Low-----	0.10			
Scholle-----	0-5	22-27	0.6-2.0	0.09-0.12	7.4-7.8	<2	Low-----	0.10	4	8	.8-1
	5-60	28-35	0.6-2.0	0.10-0.15	7.4-8.4	<2	Moderate	0.15			
47-----	0-4	20-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low-----	0.37	5	4L	.5-.9
La Fonda	4-60	18-35	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
48-----	0-3	15-20	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low-----	0.55	5	3	<1
Largo	3-60	25-35	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.43			

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Minhos/cm					Pct
49*:											
Largo-----	0-4	15-27	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low-----	0.43	5	4L	<1
	4-60	25-35	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.43			
Sotim-----	0-3	27-35	0.2-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.37	5	4L	.5-1
	3-60	18-35	0.2-0.6	0.16-0.19	7.9-8.4	<2	Moderate	0.37			
50*:											
Lehmans-----	0-3	28-35	0.6-2.0	0.09-0.12	6.6-7.8	<4	Moderate	0.10	1	8	.5-1
	3-12	35-50	0.06-0.2	0.10-0.13	6.6-7.8	<4	High-----	0.15			
	12	---	---	---	---	---	---	---			
Luzena-----	0-3	20-27	0.6-2.0	0.12-0.14	6.1-7.3	<2	Low-----	0.20	1	8	1-2
	3-14	35-40	0.06-0.2	0.10-0.14	6.1-7.8	<2	High-----	0.15			
	14	---	---	---	---	---	---	---			
51*.											
Lithic											
Haplargids											
52*:											
Lozier-----	0-9	20-27	0.08-0.12	0.05-0.10	7.9-8.4	<2	Low-----	0.10	1	8	<1
	9-35	---	---	---	---	---	---	---			
Rock outcrop.											
53*:											
Luzena-----	0-2	20-27	0.6-2.0	0.11-0.12	6.1-7.3	<2	Moderate	0.20	1	7	1-2
	2-14	35-40	0.06-0.2	0.10-0.14	6.1-7.8	<2	High-----	0.15			
	14	---	---	---	---	---	---	---			
Rock outcrop.											
54-----	0-10	10-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-----	0.37	5	4L	2-3
Manzano	10-60	18-34	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.37			
55-----	0-4	30-40	0.2-0.6	0.19-0.21	7.4-8.4	<4	Moderate	0.37	5	4L	.5-.9
Marconi	4-41	35-60	0.06-0.2	0.11-0.13	7.4-8.4	4-8	High-----	0.32			
	41-66	35-60	0.2-0.6	0.19-0.21	7.4-8.4	<4	Moderate	0.32			
56-----	0-7	18-27	0.6-2.0	0.13-0.19	7.4-8.4	<4	Moderate	0.43	5	4L	.5-1
Mimbres	7-26	18-35	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.37			
	26-60	18-35	0.6-2.0	0.16-0.21	7.9-8.4	<4	Moderate	0.37			
57-----	0-4	20-27	0.6-2.0	0.17-0.19	7.4-8.4	<2	Low-----	0.43	5	4L	.5-.7
Mimbres	4-40	18-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37			
	40-60	18-27	0.6-2.0	0.17-0.19	7.4-8.4	<2	Low-----	0.43			
58-----	0-5	28-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.32	5	4L	.5-.7
Mimbres	5-27	18-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37			
	27-60	27-35	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
59*:											
Minlith-----	0-2	0-15	6.0-20	0.05-0.08	6.6-7.3	<2	Low-----	0.10	1	2	.3-.5
	2-8	10-15	6.0-20	0.03-0.06	6.6-8.4	<2	Low-----	0.05			
	8	---	---	---	---	---	---	---			
Rock outcrop.											
60-----	0-2	20-25	0.6-2.0	0.07-0.09	6.6-7.8	<2	Low-----	0.10	1	7	1-2
Muzzler	2-13	35-50	0.06-0.2	0.07-0.09	6.6-7.8	<2	Moderate	0.10			
	13	---	---	---	---	---	---	---			
61*:											
Muzzler-----	0-6	18-25	0.6-2.0	0.07-0.09	6.6-7.8	<2	Low-----	0.15	3	7	1-2
	6-17	35-50	0.06-0.2	0.07-0.09	6.6-7.8	<2	Moderate	0.10			
	17	---	---	---	---	---	---	---			

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
61*: Rock outcrop.											
62----- Nickel	0-12 12-60	5-15 5-10	2.0-6.0 0.2-0.6	0.07-0.09 0.04-0.07	7.9-8.4 7.9-8.4	<2 <2	Low----- Low-----	0.10 0.10	3	4L	<.5
63*: Nickel-----	0-12 12-24 24-60	5-15 5-10 5-10	2.0-6.0 0.2-0.6 0.2-0.6	0.07-0.09 0.04-0.07 0.04-0.07	7.9-8.4 7.9-8.4 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.10 0.10 0.05	3	4L	<.5
Chamberino-----	0-16 16-60	10-25 5-15	0.6-2.0 0.2-0.6	0.06-0.10 0.04-0.07	7.9-8.4 7.9-8.4	2-4 2-4	Low----- Low-----	0.20 0.10	3	5	.4-.6
64*: Nickel-----	0-13 13-22 22-60	5-15 5-10 5-10	2.0-6.0 0.2-0.6 0.2-0.6	0.07-0.09 0.04-0.07 0.04-0.07	7.9-8.4 7.9-8.4 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.10 0.10 0.10	3	4L	<.5
Tencee-----	0-3 3-12 12	10-20 10-20 ---	0.6-2.0 0.6-2.0 ---	0.05-0.07 0.05-0.07 ---	7.9-8.4 7.9-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.10 0.10 ---	1	6	.5-1
Delnorte-----	0-12 12-36 36-60	10-25 --- ---	0.6-2.0 --- ---	0.06-0.12 --- ---	7.9-8.4 --- ---	<2 --- ---	Low----- ----- -----	0.10 ----- -----	1	4L	---
65----- Pajarito	0-5 5-18 18-60	5-12 15-20 15-24	2.0-6.0 2.0-6.0 2.0-6.0	0.09-0.11 0.13-0.15 0.13-0.15	7.4-8.4 7.9-8.4 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.17 0.28 0.28	5	2	.4-.7
66----- Pajarito	0-7 7-20 20-60	15-20 15-20 15-24	2.0-6.0 2.0-6.0 2.0-6.0	0.13-0.15 0.13-0.15 0.13-0.15	7.4-8.4 7.9-8.4 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.28 0.28 0.28	5	3	.5-.8
67*: Pinaleno-----	0-3 3-28 28-60	10-15 15-25 3-8	2.0-6.0 0.6-2.0 2.0-6.0	0.04-0.07 0.05-0.09 0.03-0.06	6.1-7.8 7.4-8.4 7.4-8.4	<2 <2 <2	Low----- Low----- Low-----	0.10 0.10 0.10	3	4L	---
Nolam-----	0-2 2-17 17-60	15-20 18-35 15-20	0.6-2.0 0.6-2.0 2.0-6.0	0.04-0.06 0.04-0.08 0.04-0.06	7.4-8.4 7.4-8.4 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.10 0.10 0.10	3	7	1-2
68*: Reakor-----	0-3 3-60	15-27 25-35	0.6-2.0 0.2-0.6	0.16-0.20 0.15-0.18	7.4-8.4 7.9-8.4	2-4 2-4	Low----- Moderate	0.43 0.37	5	4L	.5-1
Dona Ana-----	0-3 3-21 21-60	5-15 18-35 15-25	2.0-6.0 0.6-2.0 0.6-2.0	0.10-0.13 0.13-0.17 0.13-0.17	7.4-8.4 7.9-8.4 7.9-8.4	<2 2-4 2-4	Low----- Moderate Moderate	0.28 0.32 0.28	5	3	.2-.5
69*: Redbank-----	0-10 10-60	7-18 4-12	2.0-6.0 2.0-6.0	0.13-0.16 0.15-0.18	7.4-8.4 7.9-8.4	<2 <2	Low----- Low-----	0.37 0.43	5	5	.5-1
Torrifluvents.											
70*: Rock outcrop											
71*: Rock outcrop.											
Courthouse-----	0-2 2-5 5-8	15-20 15-30 ---	0.6-2.0 0.6-2.0 ---	0.10-0.13 0.10-0.13 ---	7.9-8.4 7.9-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.20 0.15 ---	1	8	.5-1

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
72*: Rock outcrop.											
Deama-----	0-13 13	18-27 ---	0.6-2.0 ---	0.10-0.12 ---	7.4-8.4 ---	<2 ---	Low----- -----	0.10 ---	1	8	1-3
73*: Rock outcrop.											
Luzena-----	0-8 8-18 18	27-35 45-60 ---	0.6-2.0 0.06-0.2 ---	0.11-0.12 0.10-0.14 ---	6.1-7.3 6.1-7.8 ---	<2 <2 ---	Moderate High----- -----	0.15 0.15 ---	1	7	1-2
74*: Rock outcrop.											
Rizozo-----	0-6 6-10 10	15-25 15-25 ---	0.6-2.0 0.6-2.0 ---	0.06-0.10 0.11-0.15 ---	7.4-8.4 7.4-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.20 0.20 ---	1	8	<1
75*: Rock outcrop.											
Torriorthents.											
76*: Scholle-----	0-5 5-60	22-27 28-35	0.6-2.0 0.6-2.0	0.09-0.12 0.11-0.14	7.4-7.8 7.4-8.4	<2 <2	Low----- Moderate	0.10 0.15	4	7	.8-1
Ildefonso-----	0-14 14-60	8-17 8-17	2.0-6.0 2.0-6.0	0.09-0.11 0.06-0.08	7.4-8.4 7.4-8.4	<4 <4	Low----- Low-----	0.20 0.10	3	5	.5-1
77----- Simona	0-4 4-15 15	6-12 15-20 ---	6.0-20 2.0-6.0 ---	0.06-0.10 0.09-0.15 ---	7.4-8.4 7.4-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.20 0.24 ---	1	2	.3-.6
78*: Stellar-----	0-2 2-38 38-60	20-27 35-50 20-40	0.6-2.0 0.06-0.2 0.2-0.6	0.17-0.20 0.14-0.16 0.15-0.19	7.4-8.4 7.4-8.4 7.4-8.4	<2 <4 <4	Moderate High----- Moderate	0.37 0.32 0.32	5	5	1-2
Continental-----	0-4 4-30 30-60	5-15 35-55 25-35	2.0-6.0 0.06-0.2 0.6-2.0	0.11-0.13 0.15-0.20 0.14-0.16	7.4-7.8 7.4-7.8 7.9-8.4	<2 <2 <2	Low----- High----- Moderate	0.28 0.28 0.32	5	3	.5-1
79*: Thunderbird-----	0-2 2-26 26	18-27 35-55 ---	0.6-2.0 0.06-0.2 ---	0.16-0.18 0.10-0.15 ---	6.6-7.8 7.4-8.4 ---	<2 <2 ---	Moderate High----- -----	0.37 0.15 ---	1	5	1-2
Cabazon-----	0-4 4-16 16	27-30 35-40 ---	0.06-0.2 0.06-0.2 ---	0.13-0.15 0.12-0.14 ---	6.1-7.3 6.1-7.3 ---	<2 <2 ---	Moderate High----- -----	0.15 0.15 ---	1	7	1-3
80*: Torriorthents dissected.											
Rock outcrop.											
81----- Tres Hermanos	0-4 4-14 14-60	15-20 25-35 18-25	0.6-2.0 0.2-0.6 0.6-2.0	0.11-0.13 0.12-0.14 0.07-0.11	7.4-8.4 7.4-8.4 7.4-8.4	<2 2-4 2-4	Moderate Moderate Low-----	0.15 0.20 0.10	3	4	.5-1

See footnote at end of table.



TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
82*: Tres Hermanos---	0-3	18-27	0.6-2.0	0.11-0.13	7.4-8.4	<2	Moderate	0.20	3	5	.5-1
	3-16	25-35	0.2-0.6	0.12-0.14	7.4-8.4	2-4	Moderate	0.20			
	16-60	18-25	0.6-2.0	0.05-0.07	7.4-8.4	2-4	Low-----	0.05			
Hap-----	0-5	10-20	0.6-2.0	0.10-0.14	6.6-7.3	<2	Low-----	0.10	4	7	.5-1
	5-24	25-30	0.6-2.0	0.10-0.14	6.6-8.4	<2	Low-----	0.15			
	24-60	20-30	0.6-2.0	0.07-0.10	7.9-8.4	<2	Low-----	0.10			
83*: Urban land											
84*: Ustorthents dissected.											
Ildefonso-----	0-10	8-17	2.0-6.0	0.06-0.08	7.4-8.4	<4	Low-----	0.10	3	4L	.5-1
	10-60	8-17	2.0-6.0	0.06-0.08	7.4-8.4	<4	Low-----	0.10			
85-----	0-4	18-27	0.6-2.0	0.19-0.21	7.9-8.4	<4	Low-----	0.43	5	4L	<.5
Wink	4-31	10-20	2.0-6.0	0.11-0.13	7.9-8.4	<4	Low-----	0.24			
	31-60	10-20	2.0-6.0	0.09-0.13	7.9-8.4	<4	Low-----	0.24			
86*: Wink-----	0-2	5-15	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low-----	0.20	4	2	<.5
	2-20	8-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low-----	0.32			
	20-60	8-18	2.0-6.0	0.08-0.11	7.9-8.4	<2	Low-----	0.15			
Dona Ana-----	0-3	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-----	0.28	5	3	.2-.5
	3-17	18-35	0.6-2.0	0.10-0.15	7.9-8.4	2-4	Moderate	0.32			
	17-60	15-25	0.6-2.0	0.10-0.15	7.9-8.4	2-4	Moderate	0.28			

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 12.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
1----- Adelino	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
2----- Agua	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
3----- Agustin	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
4----- Akela	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
5*: Akela----- Rock outcrop.	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
6----- Anapra	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
7*, 8*, 9*: Anthony-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Vinton-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
10*: Aridic Argiustolls.												
Goldust-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
11*: Aridic Haplustalfs. Rock outcrop.												
12*: Arizo----- Riverwash.	A	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
13*: Arizo-----	A	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
Canutio-----	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
14----- Armijo	D	Frequent----	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.

See footnote at end of table.



TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
15----- Armijo	D	Frequent----	Brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	High.
16*: Badland.												
Nickel-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
17----- Belen	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
18*, 19*: Berino-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Dona Ana-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
20, 21----- Bluepoint	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
22, 23, 24----- Brazito	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
25*: Caliza-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Bluepoint-----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Yturbide-----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
26*: Canutio-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Pajarito-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
27----- Cave	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
28*: Courthouse----- Rock outcrop.	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
29*: Cruces-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cacique-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
30*: Delnorte-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Cave-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Tencee-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.

See footnote at end of table.



TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
31*: Dona Ana----- Loamy fine sand	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Dona Ana----- Very fine sandy loam	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
32*: Dona Ana-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Tres Hermanos----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
33----- Eba	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
34*: Elbutte-----	D	None-----	---	---	>6.0	---	---	4-20	Soft	Low-----	High-----	Low.
Courthouse-----	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
35, 36----- Glendale	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
37*: Glendale-----	B	Occasional	Brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
Gila-----	B	Occasional	Brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
38----- Goldust	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
39*: Goldust-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Pena-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
40, 41----- Harkey	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
42----- Harkey	B	None-----	---	---	4.0-6.0	Apparent	Apr-Nov	>60	---	Low-----	High-----	Moderate.
43----- Harkey	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
44----- Holloman	C	None-----	---	---	>6.0	---	---	4-20	Soft	Low-----	High-----	High.
45----- Holloman Variant	D	Rare-----	---	---	4.0-8.0	Apparent	Jan-Dec	4-20	Soft	Low-----	High-----	High.
46*: Ildefonso-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Scholle-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.

See footnote at end of table.



TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
47----- La Fonda	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
48----- Largo	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
49*: Largo-----	B	Frequent----	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
Sotim-----	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
50*: Lehmans-----	D	None-----	---	---	>6.0	---	---	7-20	Hard	Low-----	High-----	Low.
Luzena-----	D	None-----	---	---	>6.0	---	---	7-20	Hard	Low-----	Moderate	Low.
51*. Lithic Haplargids												
52*: Lozier-----	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
Rock outcrop.												
53*: Luzena-----	D	None-----	---	---	>6.0	---	---	7-20	Hard	Low-----	High-----	Low.
Rock outcrop.												
54----- Manzano	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
55----- Marconi	C	Frequent----	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
56----- Mimbres	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
57, 58----- Mimbres	B	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
59*: Minlith-----	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
Rock outcrop.												
60----- Muzzler	D	None-----	---	---	>6.0	---	---	8-20	Hard	Low-----	Moderate	Low.
61*: Muzzler-----	D	None-----	---	---	>6.0	---	---	8-20	Hard	Low-----	Moderate	Low.
Rock outcrop.												

See footnote at end of table.



TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
62----- Nickel	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
63*: Nickel-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Chamberino-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
64*: Nickel-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Tencee-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Delnorte-----	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
65, 66----- Pajarito	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
67*: Pinaleno-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Nolam-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
68*: Reakor-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Dona Ana-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
69*: Redbank-----	B	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Torrifluvents.												
70*. Rock outcrop												
71*: Rock outcrop.												
Courthouse-----	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	High-----	Low.
72*: Rock outcrop.												
Deama-----	D	None-----	---	---	>6.0	---	---	7-20	Hard	Low-----	Moderate	Low.
73*: Rock outcrop.												
Luzena-----	D	None-----	---	---	>6.0	---	---	7-20	Hard	Low-----	High-----	Low.
74*: Rock outcrop.												

See footnote at end of table.



TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
74*: Rizozo-----	D	None-----	---	---	>6.0	---	---	4-20	---	Low-----	Moderate	Low.
75*: Rock outcrop. Torriorthents.												
76*: Scholle-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Ildefonso-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
77----- Simona	D	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
78*: Stellar-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Continental-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
79*: Thunderbird-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	Low-----	High-----	Low.
Cabazon-----	D	None-----	---	---	>6.0	---	---	4-20	Hard	Low-----	Moderate	Low.
80*: Torriorthents dissected. Rock outcrop.												
81----- Tres Hermanos	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
82*: Tres Hermanos-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
Hap-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
83*. Urban land												
84*: Ustorthents dissected. Ildefonso-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
85----- Wink	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Low-----	High-----	Low.
86*: Wink-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.

See footnote at end of table.



TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
86*: Dona Ana-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 13.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adelino-----	Fine-loamy, mixed, thermic Typic Camborthids
Agua-----	Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), thermic Typic Torrifluvents
Agustin-----	Coarse-loamy, mixed, thermic Typic Camborthids
Akela-----	Loamy-skeletal, mixed (calcareous), thermic Lithic Torriorthents
Anapra-----	Fine-silty over sandy or sandy-skeletal, mixed (calcareous), thermic Typic Torrifluvents
Anthony-----	Coarse-loamy, mixed (calcareous), thermic Typic Torrifluvents
Arizo-----	Sandy-skeletal, mixed, thermic Typic Torriorthents
Armijo-----	Fine, montmorillonitic, thermic Typic Torrerts
Belen-----	Clayey over loamy, montmorillonitic (calcareous), thermic Vertic Torrifluvents
Berino-----	Fine-loamy, mixed, thermic Typic Haplargids
Bluepoint-----	Mixed, thermic Typic Torripsamments
Brazito-----	Mixed, thermic Typic Torripsamments
Cabazon-----	Clayey, montmorillonitic, mesic Lithic Argiustolls
Cacique-----	Fine-loamy, mixed, thermic Petrocalcic Paleargids
Caliza-----	Sandy-skeletal, mixed, thermic Typic Calciorthids
Canutio-----	Loamy-skeletal, mixed (calcareous), thermic Typic Torriorthents
Cave-----	Loamy, mixed, thermic, shallow Typic Paleorthids
Chamberino-----	Loamy-skeletal, mixed, thermic Typic Calciorthids
Continental-----	Fine, mixed, thermic Typic Haplargids
Courthouse-----	Loamy, mixed (calcareous), thermic Lithic Torriorthents
Cruces-----	Loamy, mixed, thermic, shallow Petrocalcic Paleargids
Deama-----	Loamy-skeletal, carbonatic, mesic Lithic Calciustolls
Delnorte-----	Loamy-skeletal, mixed, thermic, shallow Typic Paleorthids
Dona Ana-----	Fine-loamy, mixed, thermic Typic Haplargids
Eba-----	Clayey-skeletal, mixed, thermic Typic Haplargids
Elbutte-----	Clayey, mixed (calcareous), thermic, shallow Typic Torriorthents
Gila-----	Coarse-loamy, mixed (calcareous), thermic Typic Torrifluvents
Glendale-----	Fine-silty, mixed (calcareous), thermic Typic Torrifluvents
Goldust-----	Clayey-skeletal, mixed, mesic Aridic Argiustolls
Hap-----	Fine-loamy, mixed, thermic Typic Haplargids
Harkey-----	Coarse-silty, mixed (calcareous), thermic Typic Torrifluvents
Holloman-----	Loamy, gypsic, thermic, shallow Typic Torriorthents
Holloman Variant-----	Fine-loamy, gypsic, thermic, shallow Typic Torriorthents
Ildefonso-----	Loamy-skeletal, mixed, mesic Ustollic Calciorthids
La Fonda-----	Fine-loamy, mixed, mesic Ustollic Camborthids
Largo-----	Fine-silty, mixed (calcareous), thermic Typic Torriorthents
Lehmans-----	Clayey, montmorillonitic, thermic Lithic Haplargids
Lozier-----	Loamy-skeletal, carbonatic, thermic Lithic Calciorthids
Luzena-----	Clayey, montmorillonitic, mesic Lithic Argiustolls
Manzano-----	Fine-loamy, mixed, mesic Cumulic Haplustolls
Marconi-----	Fine, mixed, thermic Typic Camborthids
Mimbres-----	Fine-silty, mixed, thermic Typic Camborthids
Minlith-----	Sandy-skeletal, mixed, thermic Lithic Torriorthents
Muzzler-----	Clayey-skeletal, mixed, mesic Lithic Argiustolls
Nickel-----	Loamy-skeletal, mixed, thermic Typic Calciorthids
Nolam-----	Loamy-skeletal, mixed, thermic Ustollic Haplargids
Pajarito-----	Coarse-loamy, mixed, thermic Typic Camborthids
Pena-----	Loamy-skeletal, mixed, mesic Aridic Calciustolls
Pinaleno-----	Loamy-skeletal, mixed, thermic Typic Haplargids
Reakor-----	Fine-silty, mixed, thermic Typic Calciorthids
Redbank-----	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Rizozo-----	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Scholle-----	Fine-loamy, mixed, mesic Ustollic Haplargids
Simona-----	Loamy, mixed, thermic, shallow Typic Paleorthids
Sotim-----	Fine-loamy, mixed, thermic Typic Calciorthids
Stellar-----	Fine, mixed, thermic Ustollic Haplargids
Tencee-----	Loamy-skeletal, carbonatic, thermic, shallow Typic Paleorthids
Thunderbird-----	Fine, montmorillonitic, mesic Aridic Argiustolls
Tres Hermanos-----	Fine-loamy, mixed, thermic Typic Haplargids
Vinton-----	Sandy, mixed, thermic Typic Torrifluvents
Wink-----	Coarse-loamy, mixed, thermic Typic Calciorthids
Yturbide-----	Mixed, thermic Typic Torripsamments







SECTIONALIZED  
TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



# LEGEND

- 1 AKELA-ELBUTTE-COURTHOUSE: Shallow, well drained, nearly level to moderately rolling soils; on hills and basalt flows
- 2 DONA ANA-STELLAR-WINK: Deep, well drained, nearly level to gently sloping soils; on piedmonts
- 3 GLENDALE-GILA-BRAZITO: Deep, well drained to excessively drained, nearly level to gently sloping soils; on flood plains
- 4 ILDEFONSO-SCHOLLE-GOLDUST: Deep, well drained, nearly level to extremely steep soils; on piedmonts
- 5 LARGO-MIMBRES-ARMIJO: Deep, well drained, nearly level to gently sloping soils; on flood plains, basin floors, alluvial fans, and terraces
- 6 LUZENA-ROCK OUTCROP: Shallow, well drained, moderately undulating to extremely steep soils, and Rock outcrop; on hills, low mountains, ledges, escarpments, peaks, and ridges
- 7 NICKEL-BLUEPOINT: Deep, well drained to somewhat excessively drained, nearly level to extremely steep soils; on alluvial fans, terraces, and piedmonts
- 8 ROCK OUTCROP-TORRIORTHENTS-COURTHOUSE: Rock outcrop, and shallow to deep, well drained, moderately undulating to extremely steep soils; on piedmonts, hills, low mountains, ridges, ledges, and escarpments
- 9 SIMONA-DELNORTE-NICKEL: Shallow and deep, well drained, gently undulating to moderately undulating soils; on piedmonts
- 10 TRES HERMANOS-HAP-EBA: Deep, well drained, nearly level to moderately sloping, gravelly soils; on piedmonts

Compiled 1983

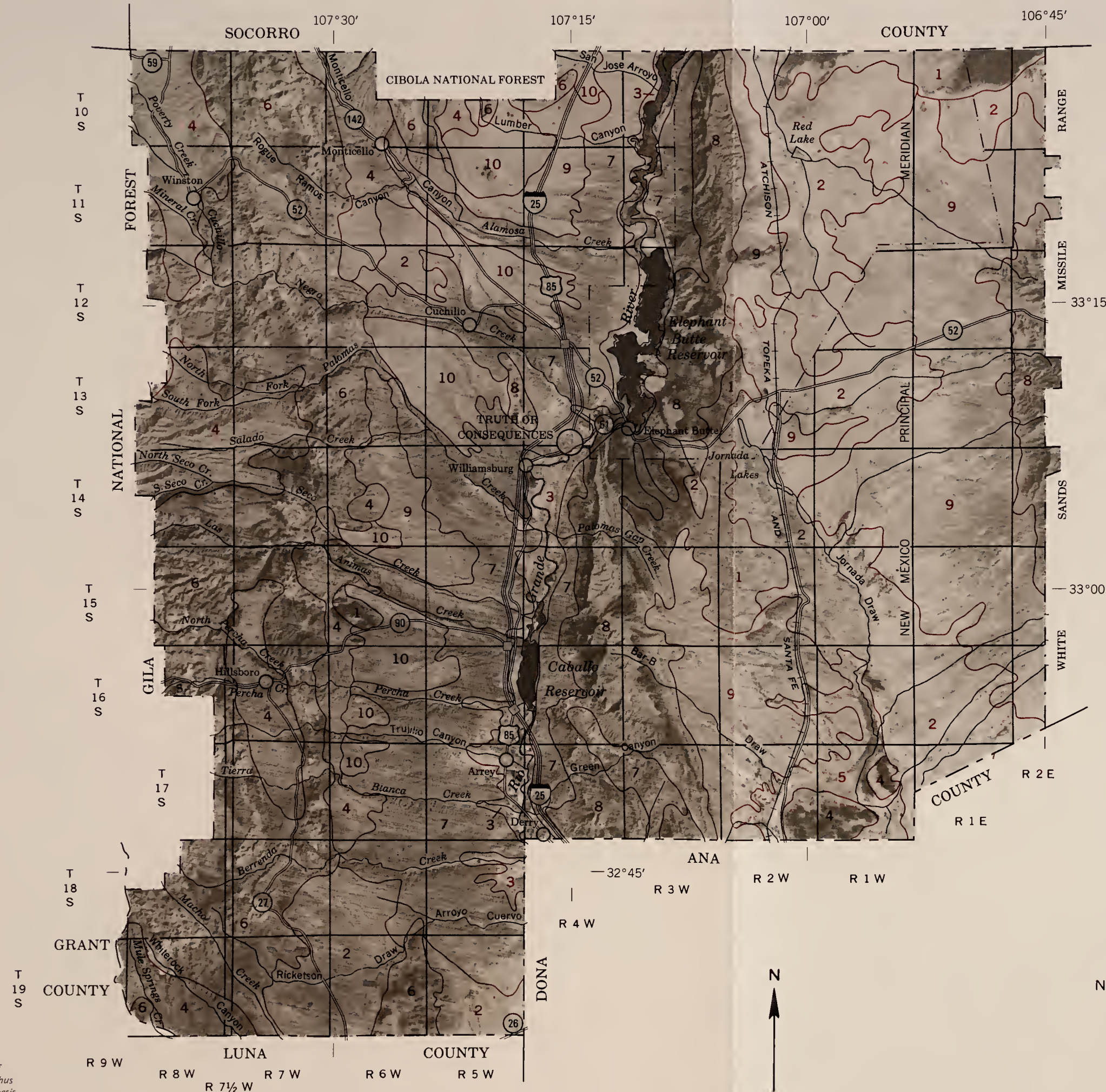
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
U. S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
NEW MEXICO STATE UNIVERSITY AGRICULTURAL EXPERIMENTAL STATION

## GENERAL SOIL MAP SIERRA COUNTY AREA, NEW MEXICO

Scale 1:506,880

2 0 2 4 6 8 Miles

2 0 8 16 Km



### SECTIONALIZED TOWNSHIP

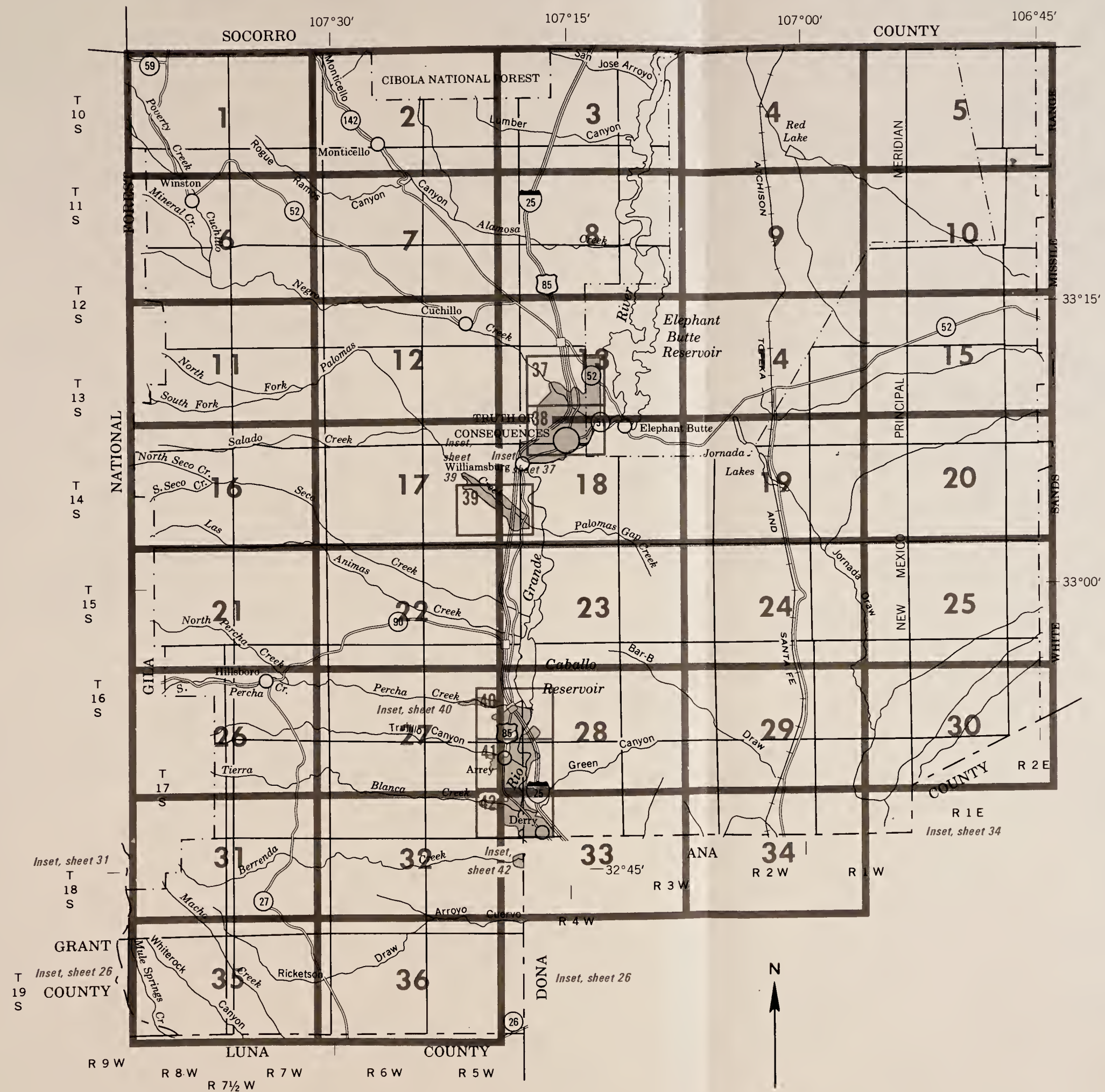
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7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



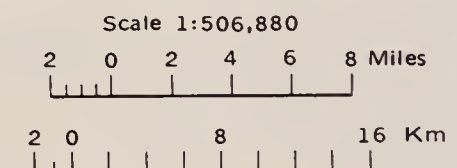
SECTIONALIZED  
TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



- Area mapped at scale of 1:20,000
- Area mapped at scale of 1:48,000

# INDEX TO MAP SHEETS SIERRA COUNTY AREA, NEW MEXICO





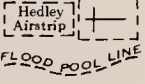




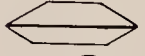

SOIL LEGEND

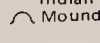
SYMBOL	NAME
1	Adelino loam *
2	Agua loam *
3	Agustin gravelly sandy loam, 1 to 9 percent slopes *
4	Akela very gravelly loam moderately rolling
5	Akela-Rock outcrop association, very steep
6	Anapra clay loam *
7	Anthony-Vinton fine sandy loams *
8	Anthony-Vinton loams *
9	Anthony-Vinton clay loams *
10	Aridic Arguistolls-Goldust association, extremely steep
11	Aridic Haplustalfs-Rock outcrop complex, extremely steep
12	Arizo-Riverwash complex, 1 to 3 percent slopes *
13	Arizo and Canutio soils, gently sloping
14	Armijo clay, 0 to 3 percent slopes *
15	Armijo clay, alkali, 0 to 2 percent slopes *
16	Badland-Nickel complex, extremely steep
17	Belen clay loam *
18	Berino-Dona Ana complex, hummocky *
19	Berino-Dona Ana association gently sloping *
20	Bluepoint loamy sand, 1 to 5 percent slopes *
21	Bluepoint loamy fine sands moderately rolling
22	Brazito loamy fine sand *
23	Brazito loamy fine sand gently sloping
24	Brazito very fine sandy loam *
25	Caliza-Bluepoint-Yturbide association, very steep
26	Canutio-Pajarito association, moderately rolling
27	Cave gravelly fine sandy loam, moderately undulating
28	Courthouse-Rock outcrop association, very steep
29	Cruces-Cacique complex, hummocky
30	Delnorte-Cave-Tencee complex, moderately rolling
31	Dona Ana complex, hummocky
32	Dona Ana-Tres Hermanos association, gently sloping
33	Eba very gravelly loam, gently sloping
34	Elbutte-Courthouse complex, moderately rolling
35	Glendale loam *
36	Glendale clay loam *
37	Glendale-Gila complex, nearly level
38	Goldust very gravelly clay loam, very steep
39	Goldust-Pena association, hilly
40	Harkey fine sandy loam *
41	Harkey loam *
42	Harkey loam, saline and alkali *
43	Harkey clay loam *
44	Holloman fine sandy loam, moderately undulating
45	Holloman Variant clay loam, moderately undulating
46	Ildefonso-Scholle association, hilly
47	La Fonda loam, gently sloping
48	Largo very fine sandy loam gently sloping
49	Largo-Sotim association gently sloping
50	Lehmans-Luzena association, very steep
51	Lithic Haplargids, moderately sloping
52	Lozier-Rock outcrop association, hilly
53	Luzena-Rock outcrop association, very steep
54	Manzano loam, gently sloping
55	Marconi silty clay loam, 0 to 3 percent slopes *
56	Mimbres silt loam, gently sloping
57	Mimbres silt loam *
58	Mimbres clay loam *
59	Minilith-Rock outcrop association, moderately rolling
60	Muzzler very gravelly loam, hilly
61	Muzzler-Rock outcrop association, extremely steep
62	Nickel very gravelly fine sandy loam, very steep
63	Nickel-Chamberino association gently sloping
64	Nickel-Tencee-Delnorte complex, moderately sloping
65	Pajarito loamy sand, 1 to 5 percent slopes *
66	Pajarito fine sandy loam *
67	Pinaleno-Nolam association, moderately sloping
68	Reakor-Dona Ana association gently sloping
69	Redbank-Torrifluvents association, gently sloping
70	Rock outcrop, extremely steep
71	Rock outcrop-Courthouse complex, extremely steep
72	Rock outcrop-Deama Association extremely steep
73	Rock outcrop-Luzena association, extremely steep
74	Rock outcrop-Rizozo association, extremely steep
75	Rock outcrop-Torriorthents association, extremely steep
76	Scholle-Ildefonso association, moderately rolling
77	Simona loamy fine sand, gently sloping
78	Stellar-Continental association, gently sloping
79	Thunderbird-Cabezon association, moderately rolling
80	Torriorthents dissected-Rock outcrop association, very steep
81	Tres Hermanos gravelly fine sandy loam, gently sloping
82	Tres Hermanos-Hap association gently sloping
83	Urban land
84	Ustorthents dissected-Ildefonso complex, extremely steep
85	Wink silt loam, gently sloping
86	Wink-Dona Ana association, gently sloping
W	Water

\* Map units are narrowly defined. Map units without the asterisk are broadly defined.




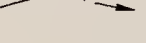
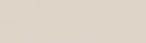

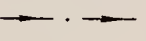

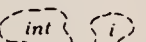





CONVENTIONAL AND SPECIAL  
SYMBOLS LEGEND

CULTURAL FEATURES


BOUNDARIES	
National, state or province	— — — —
County or parish	— — — —
Minor civil division	— — — —
Reservation (national forest or park, state forest or park, and large airport)	— . — —
Land grant	— . . — —
Limit of soil survey (label)	— — — —
Field sheet matchline & neatline	— — — —
AD HOC BOUNDARY (label)	
Small airport, airfield, park, oilfield, cemetery, or flood pool	
STATE COORDINATE TICK	
LAND DIVISION CORNERS (sections and land grants)	L + + + T
ROADS	
Divided (median shown if scale permits)	=====
Other roads	=====
Trail	- - - - -
ROAD EMBLEM & DESIGNATIONS	
Interstate	
Federal	
State	
County, farm or ranch	
RAILROAD	
POWER TRANSMISSION LINE (normally not shown)	.....
PIPE LINE (normally not shown)	—   —   —   —   —
FENCE (normally not shown)	- x - x - x - x -
LEVEES	
Without road	
With road	
With railroad	
DAMS	
Large (to scale)	
Medium or small	
PITS	
Gravel pit	x
Mine or quarry	x

MISCELLANEOUS CULTURAL FEATURES	
Farmstead, house (omit in urban areas)	•
Church	+
School	+
Indian mound (label)	
Located object (label)	○
Tank (label)	•
Wells, oil or gas	+
Windmill	x
Kitchen midden	—

WATER FEATURES

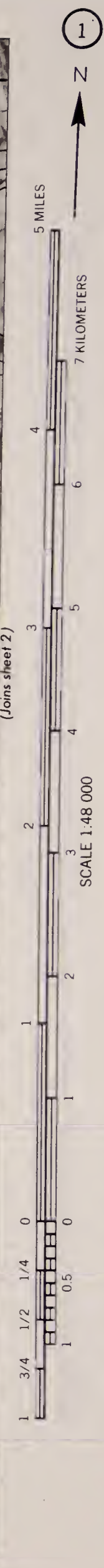
DRAINAGE	
Perennial, double line	
Perennial, single line	
Intermittent	
Drainage end	
Canals or ditches	
Double-line (label)	
Drainage and/or irrigation	
LAKES, PONDS AND RESERVOIRS	
Perennial	
Intermittent	
MISCELLANEOUS WATER FEATURES	
Marsh or swamp	
Spring	
Well, artesian	
Well, irrigation	
Wet spot	

SPECIAL SYMBOLS FOR  
SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS	
ESCARPMENTS	
Bedrock (points down slope)	~~~~~
Other than bedrock (points down slope)	~~~~~
SHORT STEEP SLOPE	.....
GULLY	~~~~~
DEPRESSION OR SINK	◇
SOIL SAMPLE SITE (normally not shown)	⊙
MISCELLANEOUS	
Blowout	∪
Clay spot	※
Gravelly spot	⋄
Gumbo, slick or scabby spot (sodic)	∅
Dumps and other similar non soil areas	≡
Prominent hill or peak	⊙
Rock outcrop (includes sandstone and shale)	+
Saline spot	+
Sandy spot	∴
Severely eroded spot	≡
Slide or slip (tips point upslope)	}}}
Stony spot, very stony spot	0 ⊙



SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 1  
R. 8 W. 1 R. 7 W.





R. 7 W. | R. 6 W.

R. 6 W. | R. 5 W.

SOCORRO COUNTY

CIBOLA NATIONAL FOREST

N

5 MILES

7 KILOMETERS

4

6

3

4

2

3

1

1

0

0

1/4

3/4

(Joins sheet 1)

SCALE 1:48 000

T. 11 S. | T. 10 S.

(Joins sheet 7)

(Joins sheet 3)







(Joins sheet 4)

(Joins sheet 8)

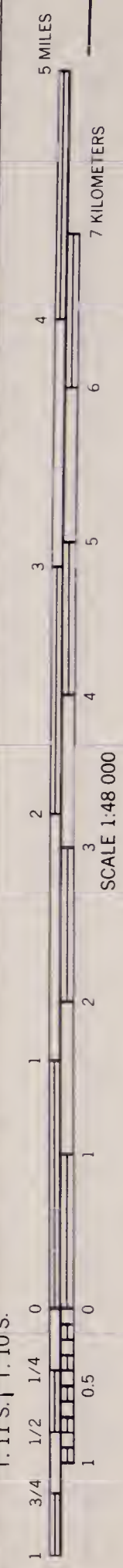
Coordinate grid ticks and land division corners, if shown, are approximately conditioned (Joins sheet 2)

U. S. G. S. 1:50,000





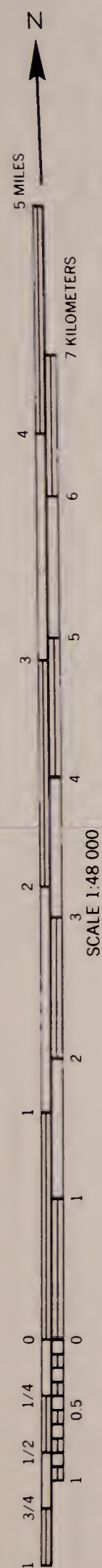




(Joins sheet 4)

(Joins sheet 10)















(Joins sheet 4)



(Joins sheet 8)

(Joins sheet 10)

(Joins sheet 14)

R. 1 W.

T. 12 S. 1 T. 11 S.

SCALE 1:48 000

5 MILES

7 KILOMETERS



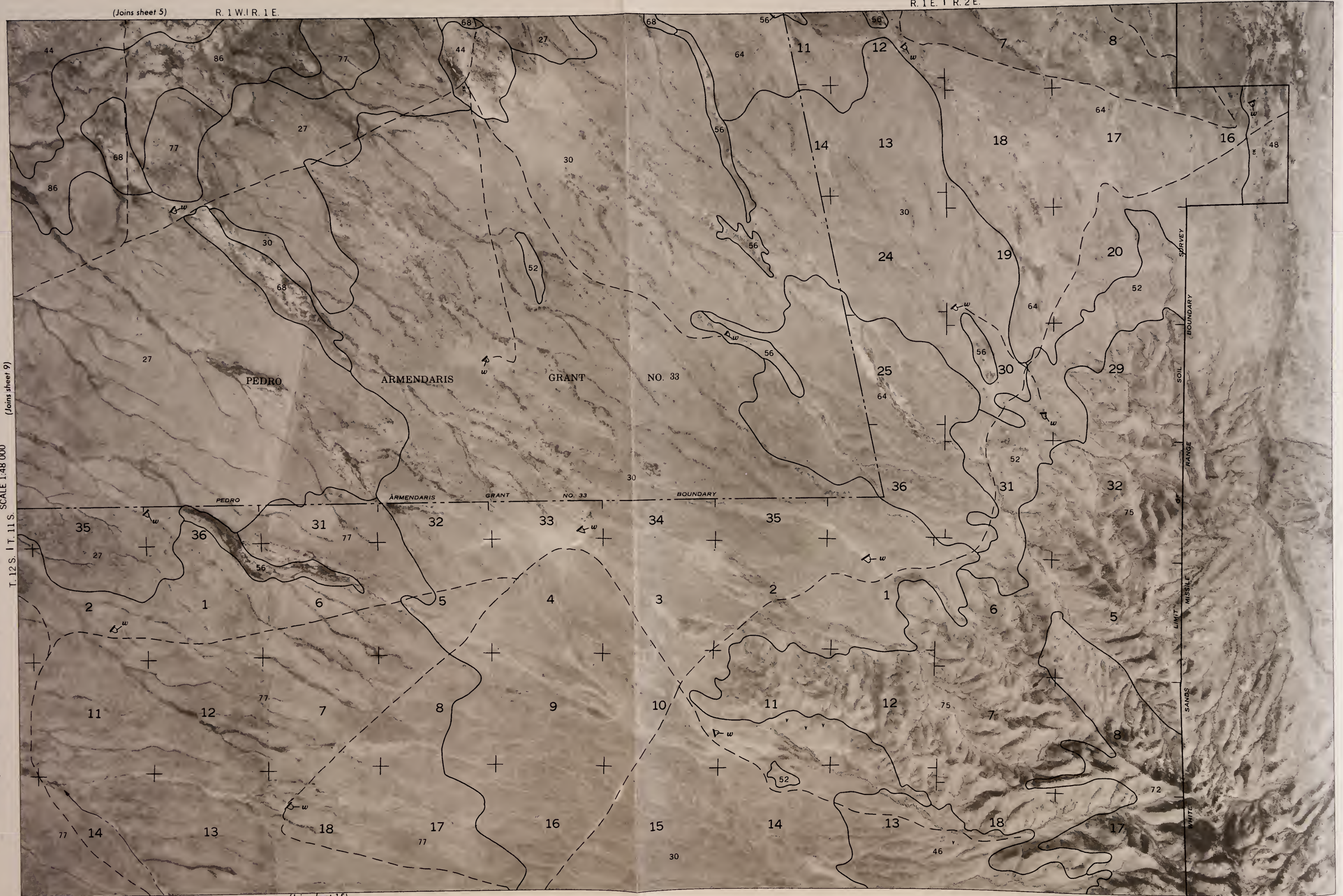
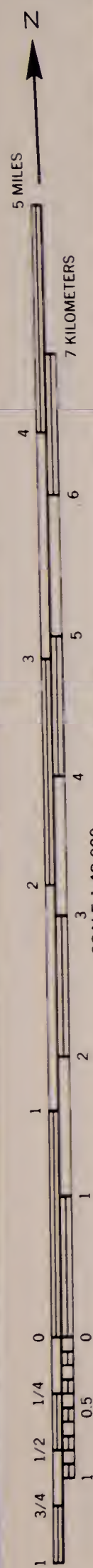
SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO - SHEET NUMBER 10

10

(Joins sheet 5)

R. 1 W. 1 R. 1 E.

R. 1 E. 1 R. 2 E.



(Joins sheet 15)



SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 11

R. 8 W. | R. 7 W.

(Joins sheet 6)

11



5 MILES

7 KILOMETERS

(Joins sheet 12)

SCALE 1:48 000

1 3/4 1/2 1/4 0 0.5 1



(Joins sheet 16)







# SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 13

R. 5 W. I. R. 4 W.

R. 4 W. I. R. 3 W.

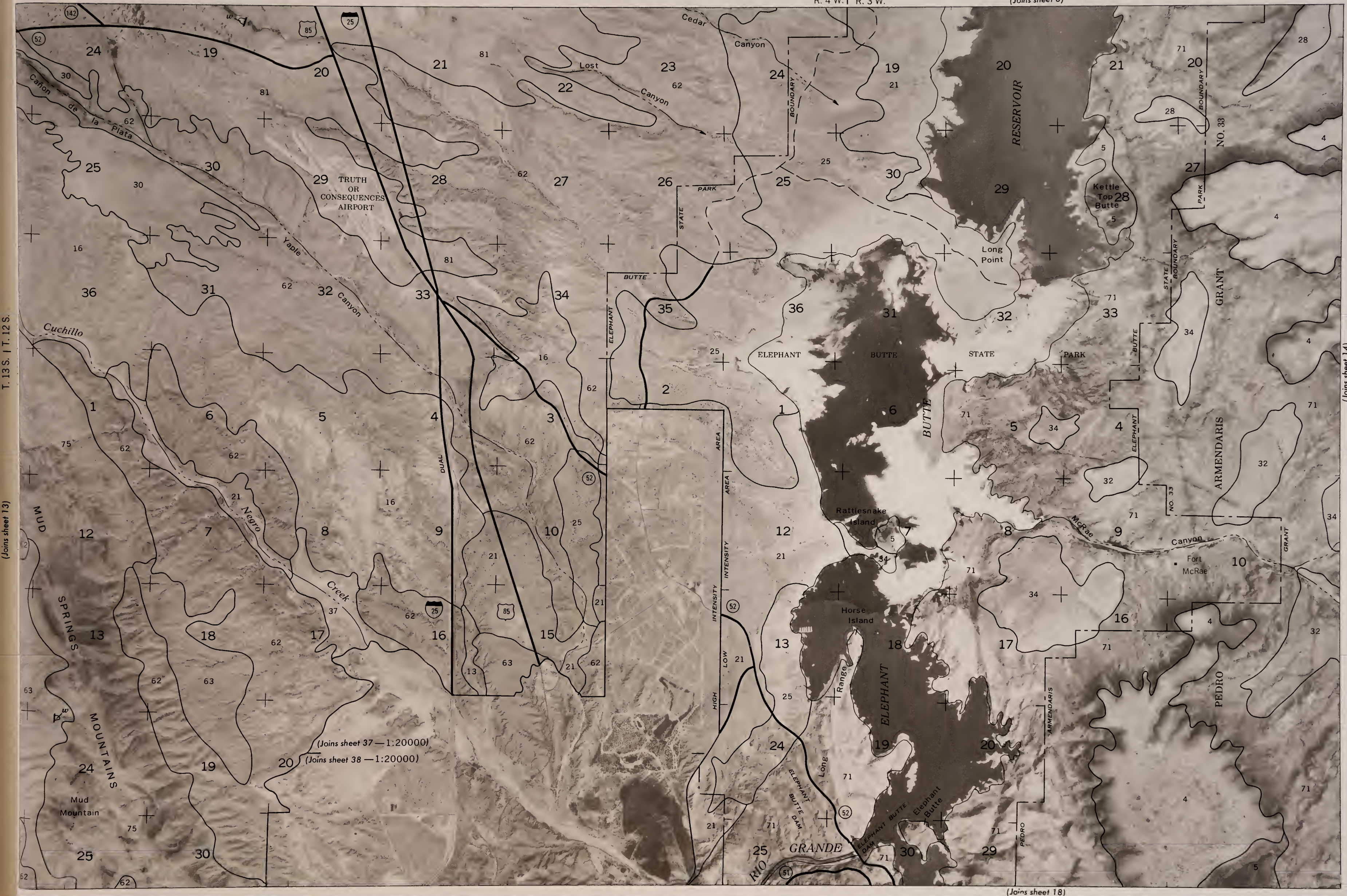
(Joins sheet 8)

13

T. 13 S. I. T. 12 S.  
(Joins sheet 13)

(Joins sheet 14)

SCALE 1:48 000



5 MILES

7 KILOMETERS

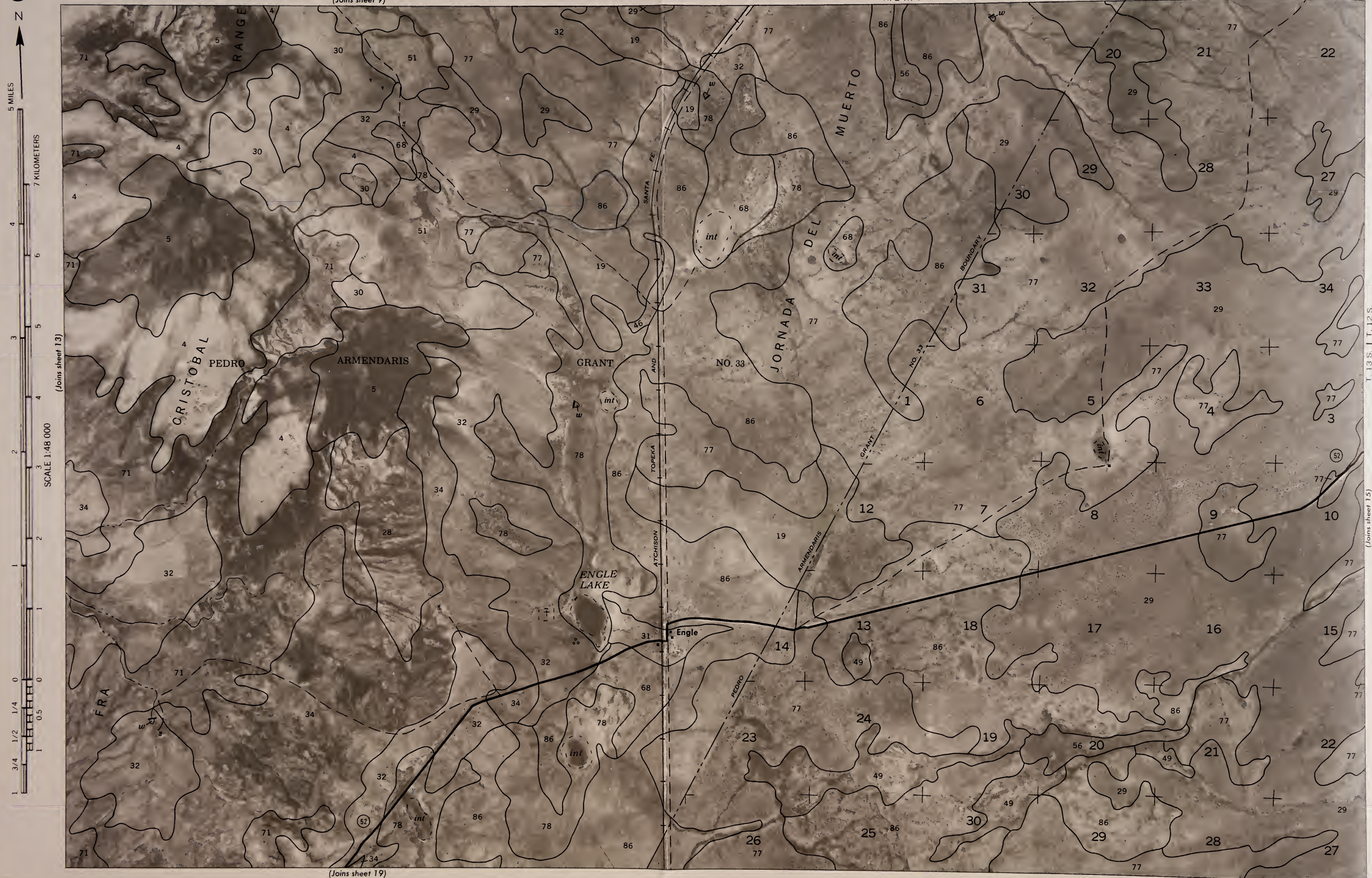
1 3/4 1/2 1/4 0 0 0.5 1

0 0.5 1

0 0.5 1

0 0.5 1







SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 15

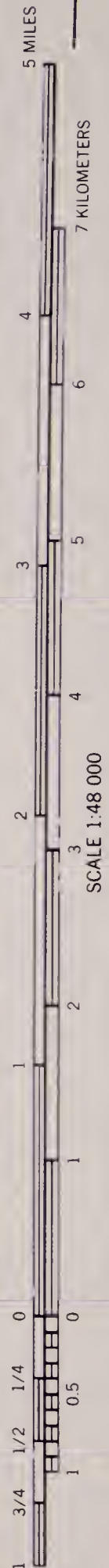
R 1 W. | R 1 E.

R. 1 E. | R. 2 E. (Joins sheet 10)

15

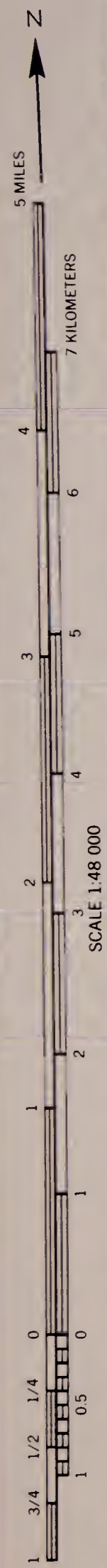
T. 13 S. | T. 12 S.

(Joins sheet 15)



(Joins sheet 20)





(Joins sheet 11)

R. 8 W. | R. 7 W.

T. 14 S. | T. 13 S.

(Joins sheet 17)

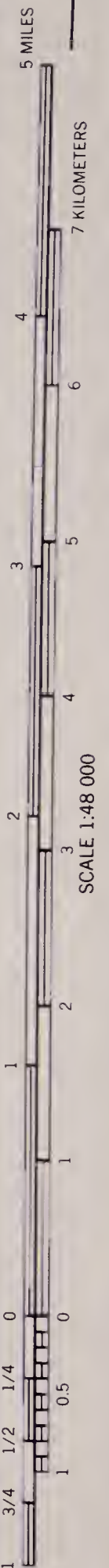
T. 15 S. | T. 14 S.

(Joins sheet 21)

Coordinates and ticks and land division corner shown are approximately positioned



SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 17









SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO - SHEET NUMBER 19

R. 3 W. | R. 2 W.

R. 2 W. | R. 1 W.

(Joins sheet 14)

19



5 MILES

7 KILOMETERS

T. 14 S. | T. 13 S.

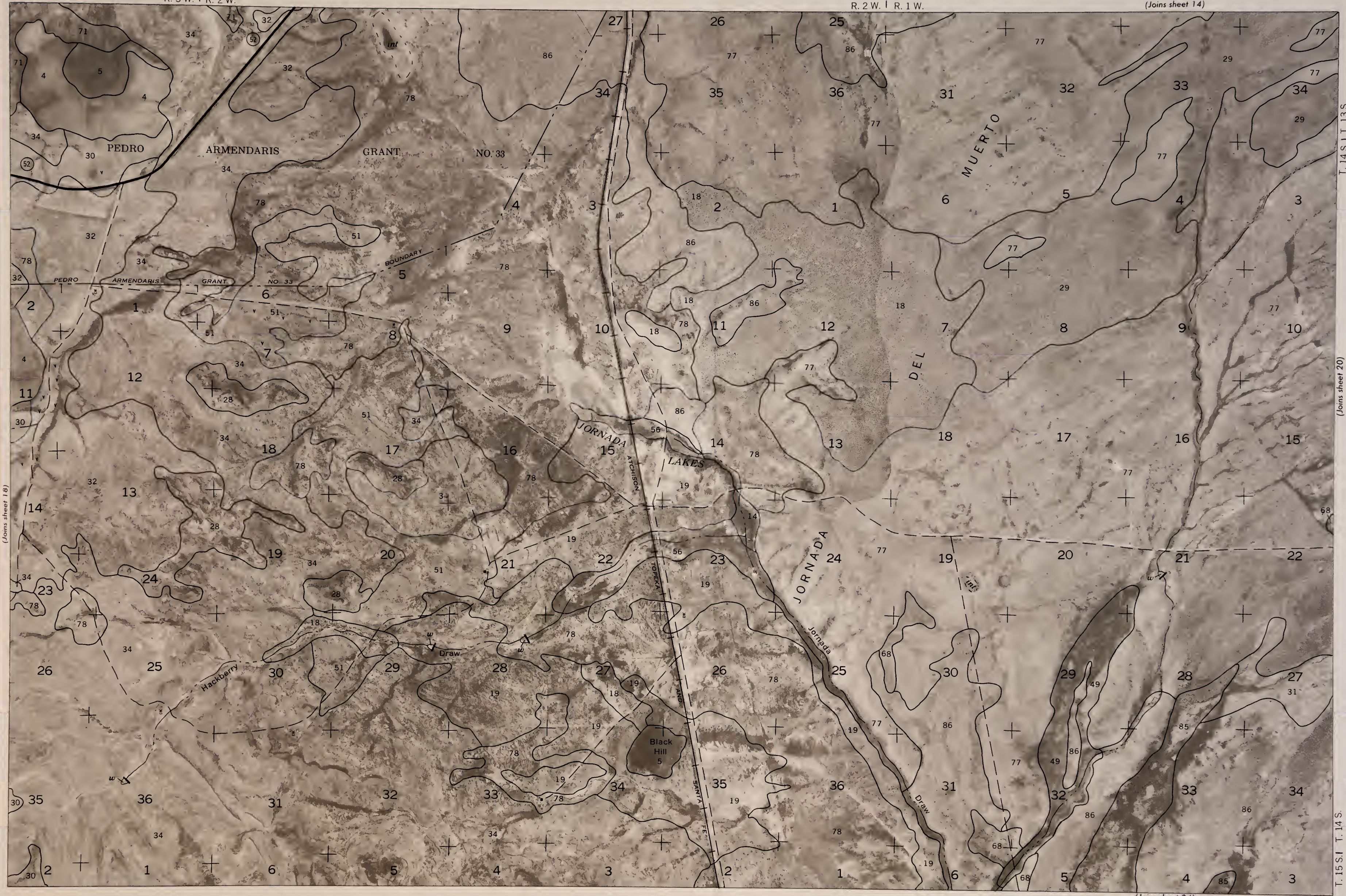
(Joins sheet 20)

SCALE 1:48 000

T. 15 S. | T. 14 S.

(Joins sheet 24)

(Joins sheet 18)





R. 1 W. | R. 1 E.

R. 1 E. | R. 2 E.



## EMAILS

7 KILOMETERS

9

1

1

11

11

A

10

1

11

111

1

1

22

10

10

38

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# F

11

(Joins sheet 19)

3  
SCALE 1:48 000

(Joins sheet 25)

MOUNTAINS

ANDRE S.

57

75

2

T. 14 S. | T. 13 S.

r. 15 s. | r. 14 s.



# SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 21

R. 8 W. | R. 7 W.

(Joins sheet 16)

21

N

5 MILES

7 KILOMETERS

(Joins sheet 22)

SCALE 1:48 000

1 3/4 1/2 1/4 0 0.5 1

T. 16 S. | T. 15 S.

R. 8 W. | R. 7 1/2 W. | R. 7 W.

(Joins sheet 26)









SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 23

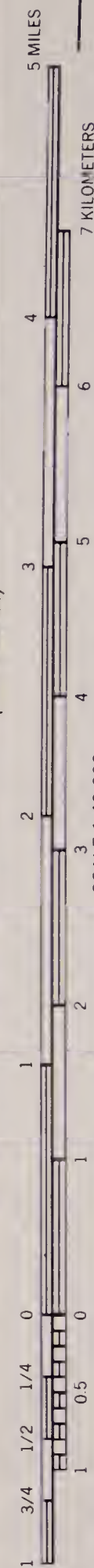
R. 5 W. | R. 4 W.

R. 4 W. | R. 3 W.

(Joins sheet 18)



(Joins sheet 24)



23

(Joins sheet 28)



R. 2 W. | R. 1 W.



(Joins sheet 29)

Joins sheet 25)

T. 16 S. | T. 15 S.



# SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 25

R. 1 W. | R. 1 E.

R. 1 E. | R. 2 E.

(Joins sheet 20)

25



5 MILES

7 KILOMETERS

3

4

5

6

7

8

9

10

11

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14

15

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18

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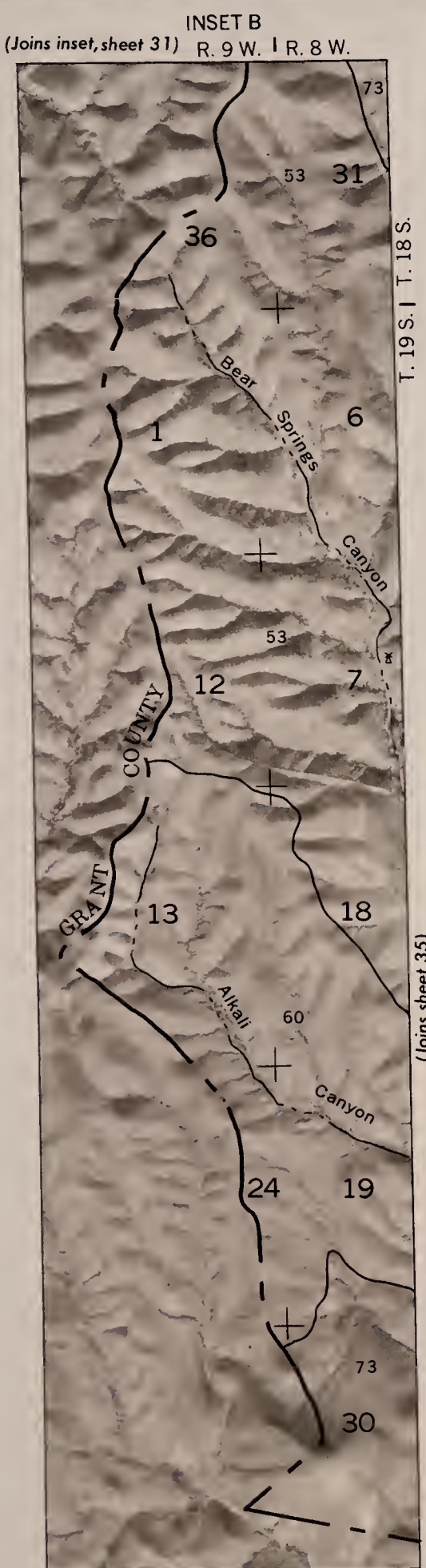
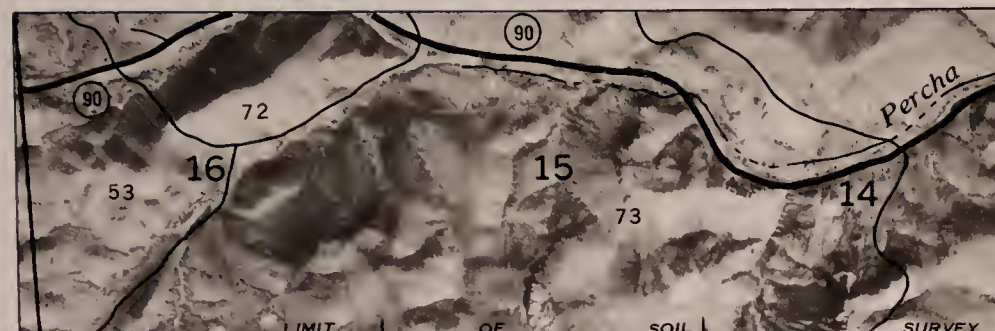
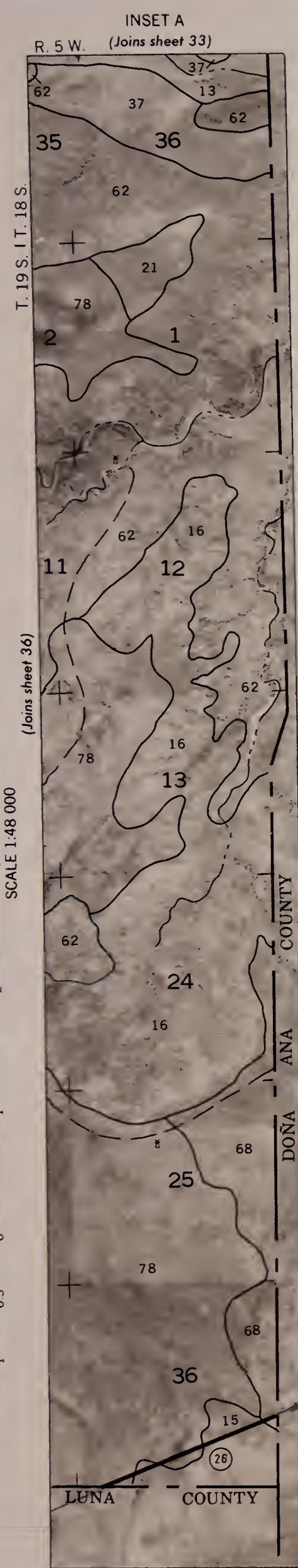
290

291



# SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 26

(Joins sheet 21) R. 8 W. 1 R. 7 1/2 W. 1 R. 7 W.



GILA NATIONAL FOREST



(Joins sheet 27) T. 17 S. 1 T. 16 S.



SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 27

R. 7 W. | R. 6 W.

R. 6 W. | R. 5 W.

(Joins sheet 22)

27



5 MILES

7 KILOMETERS

(Joins sheet 28)

SCALE 1:48 000

(Joins sheet 42 | Joins sheet 28)

— 1:20000

(Joins sheet 26) T. 17 S. | T. 16 S.

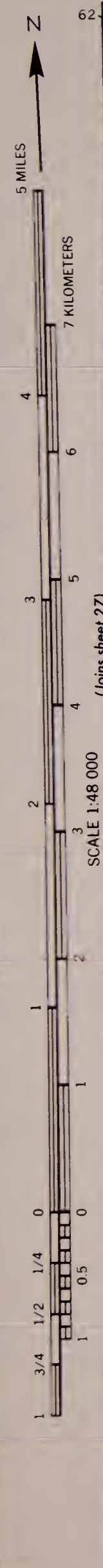




R. 5 W. | R. 4 W.

(Joins sheet 23)

R. 4 W. | R. 3 W.



SCALE 1:48 000  
(Joins sheet 27)

(Joins sheet 40 - 1:20000)  
(Joins sheet 41 - 1:20000)

(Joins sheet 41 - 1:20000)  
(Joins sheet 42 - 1:20000)

(Joins sheet 33)

(Joins sheet 29) T. 17 S. | T. 16 S.



SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO - SHEET NUMBER 29

R. 3 W. | R. 2 W.

R. 2 W. | R. 1 W.

(Joins sheet 24)

29



(Joins sheet 28) T. 17 S. | T. 16 S.

(Joins sheet 30)

5 MILES

7 KILOMETERS

SCALE 1:48 000

(Joins sheet 34)



(Joins sheet 25)

R. 1 W. | R. 1 E.

R. 1 E. | R. 2 E.



(Joins inset, sheet 34)

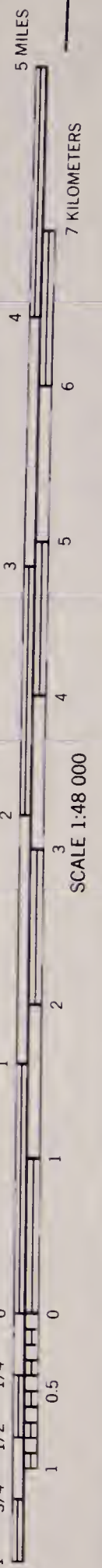


# SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO - SHEET NUMBER 31

R. 8 W. | R. 7 1/2 W. | R. 7 W.

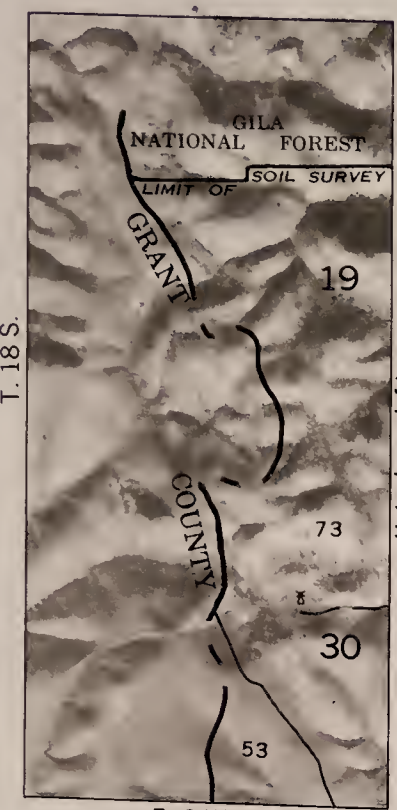
(Joins sheet 26)

31



(Joins sheet 32)

(Joins sheet 35)



R. 9 W. | R. 8 W.  
(Joins inset B, sheet 26)

(Joins lower left)

(Joins inset, upper left)



R. 7 W. | R. 6 W.

(Joins sheet 27)

R. 6 W. | R. 5 W.



5 MILES

7 KILOMETERS

4

6

3

5

4

2

3

1

2

1

1

1

1

1

0

0

1

0.5

1

1/4

3/4

SCALE 1:48 000  
(Joins sheet 31)



(Joins sheet 36)

T. 18 S. | T. 17 S.

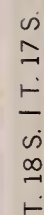
(Joins sheet 33)



## 33

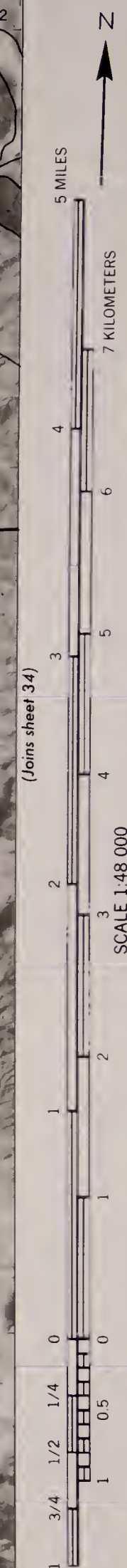
R. 4 W. | R. 3 W.

(Joins sheet 28)

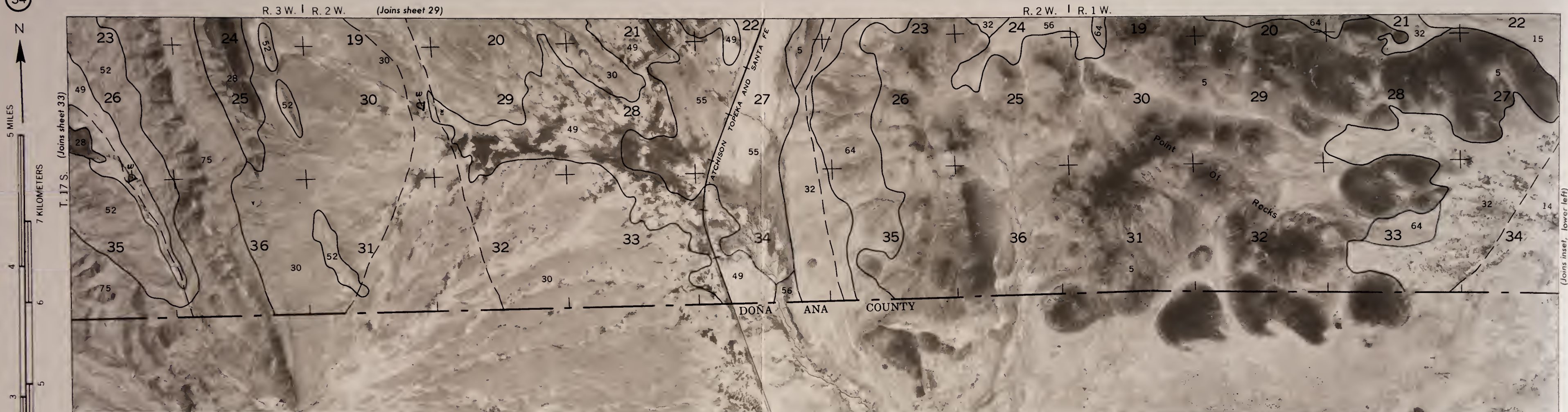


Joins sheet 32)

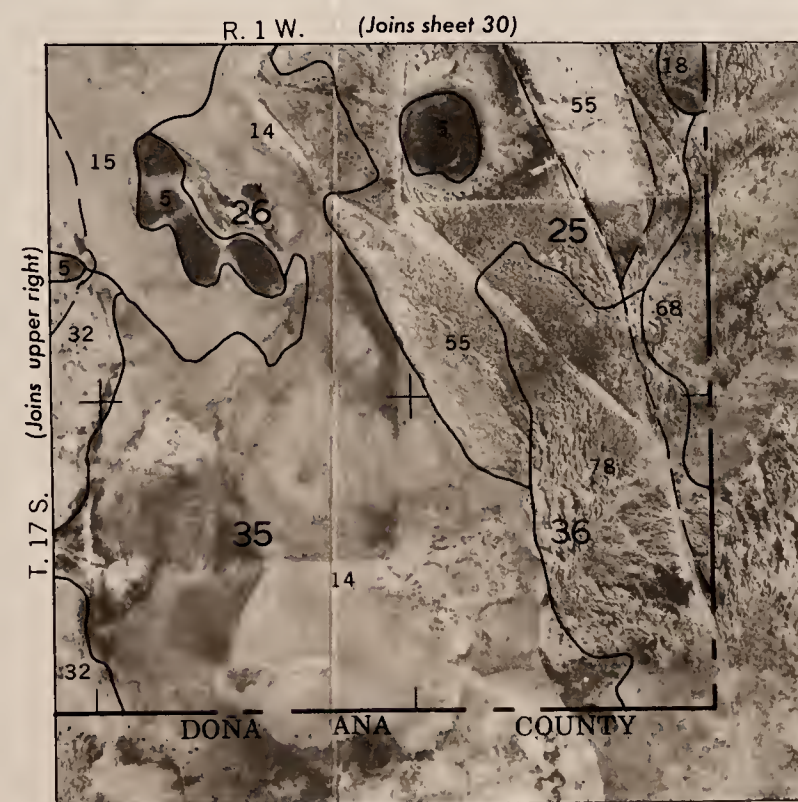
(Joins inset A, sheet 26)







INSET A





SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 35

R. 8 W. 1 R. 7 1/2 W. R. 7 W.

(Joins sheet 31)

35

N

5 MILES

7 KILOMETERS

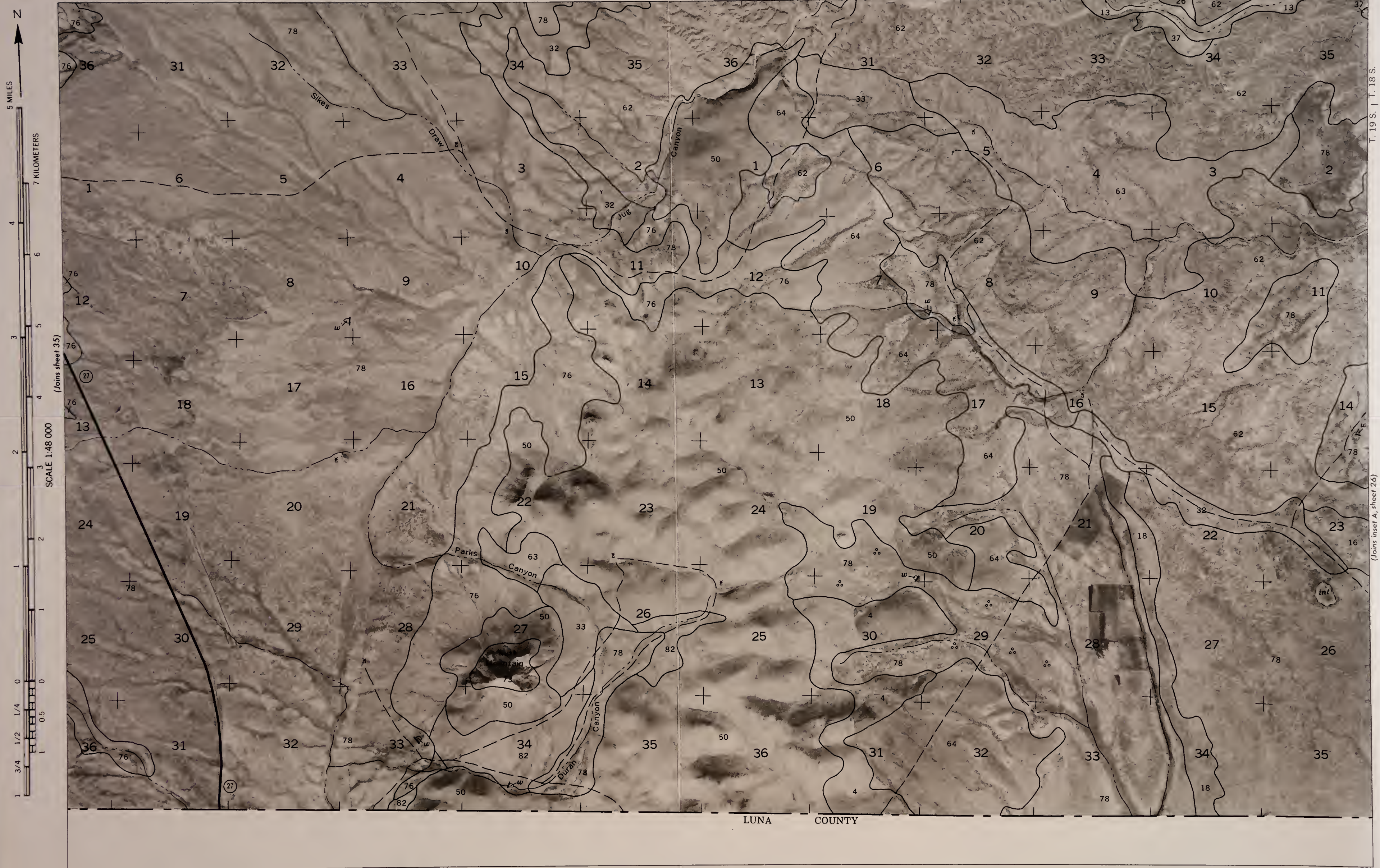
SCALE 1:48 000

T. 19 S. 1 T. 18 S.

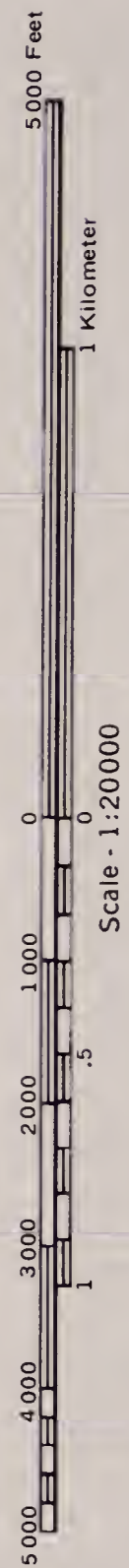
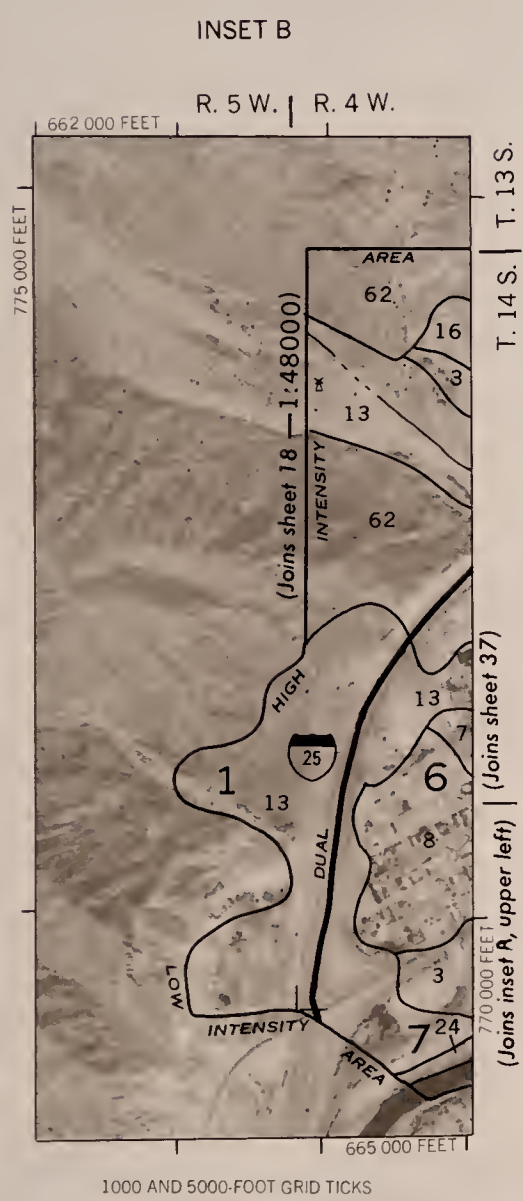
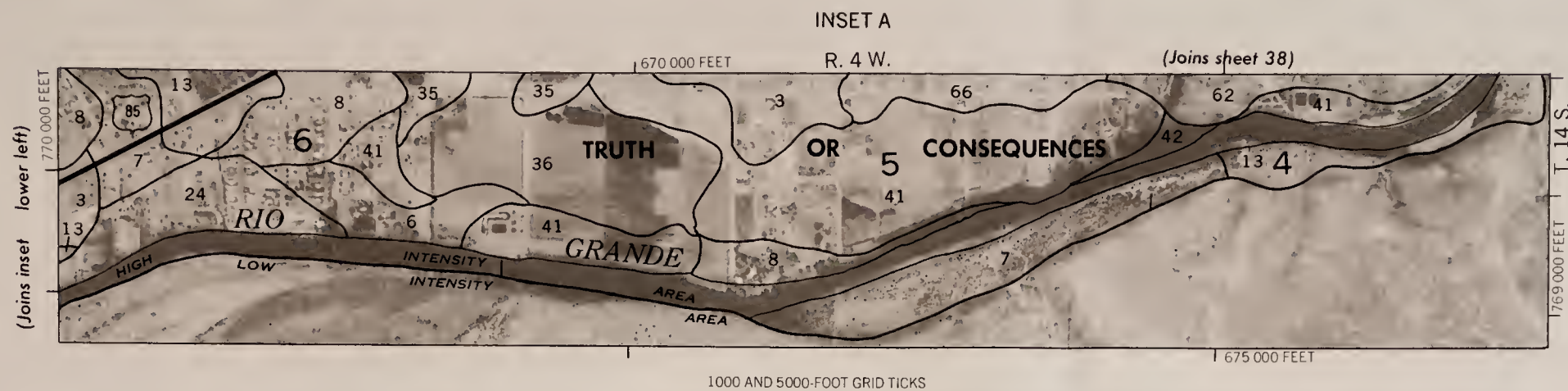
(Joins inset B, sheet 26)



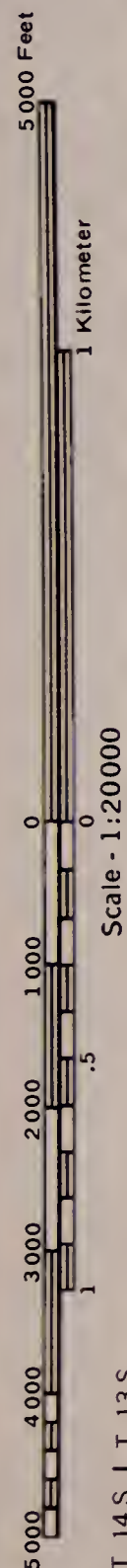












Scale - 1:20000

T. 14 S. | T. 13 S.

(Joins inset sheet 37)



670 000 FEET

(Joins inset A, sheet 37)

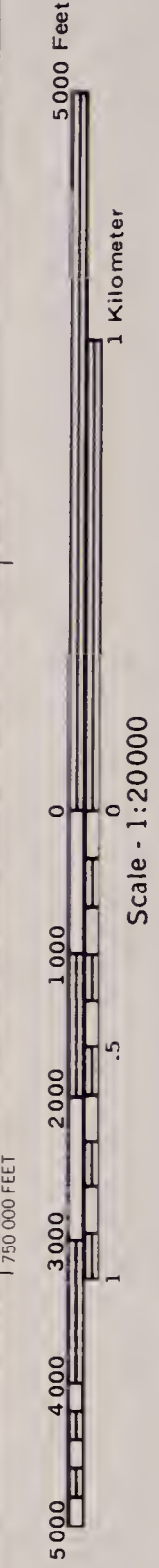
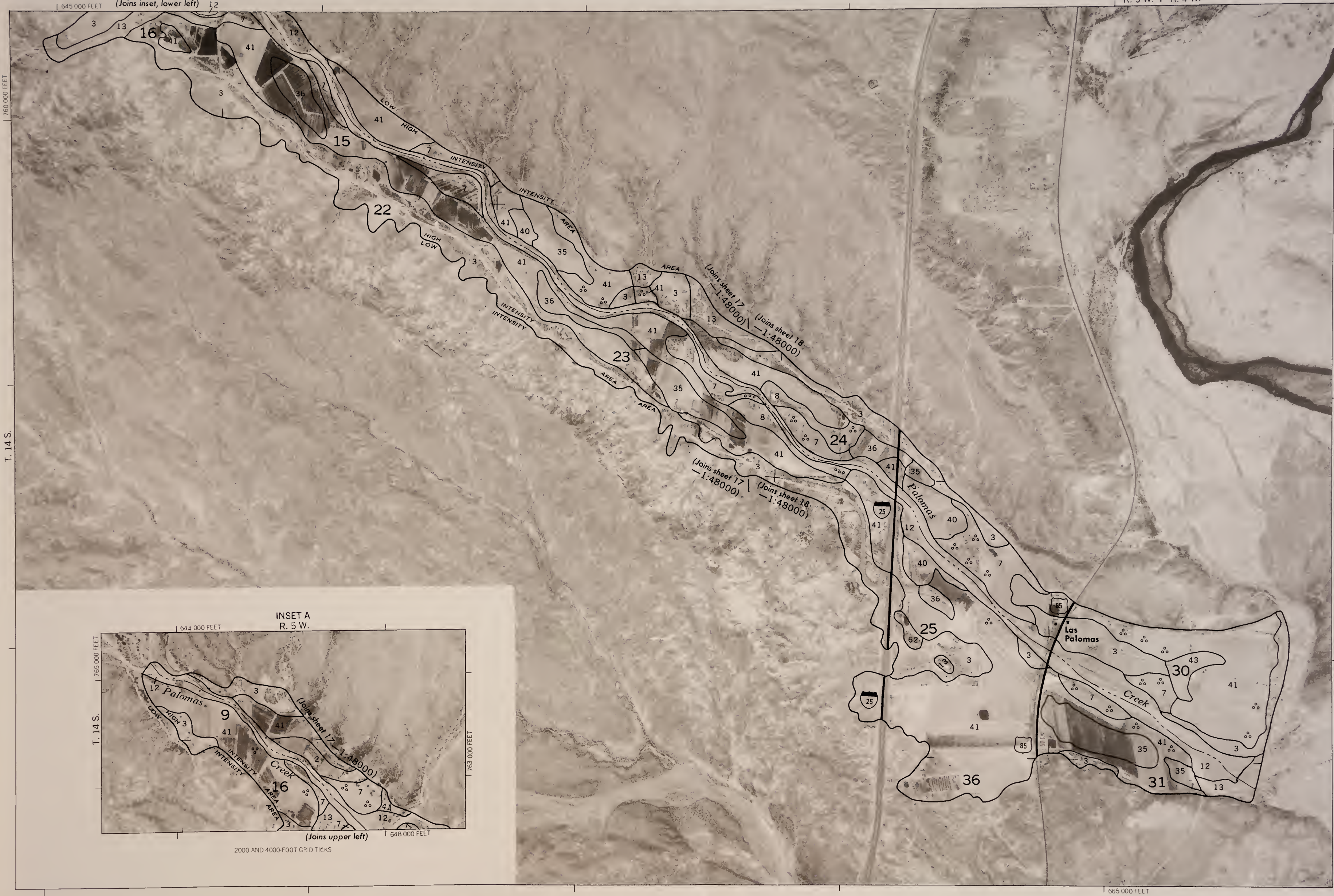
(Joins sheet 13 — 1:48000)

(Joins sheet 18 — 1:48000)

785 000 FEET

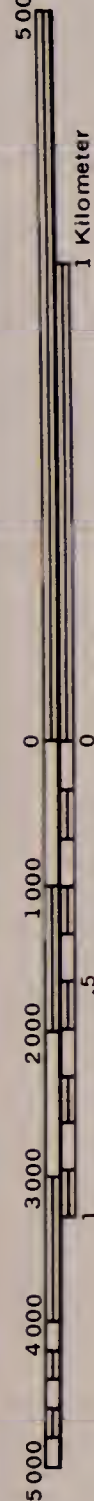
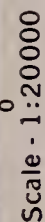


R. 5 W. 1 R. 4 W.



Coordinate grid ticks and land division corners, if shown, are approximately positioned.





695 000 FEET

T. 16 S.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



# SOIL SURVEY OF SIERRA COUNTY AREA, NEW MEXICO — SHEET NUMBER 41

(Joins sheet 40) R. 5 W. | R. 4 W.

41



T. 17 S. | T. 16 S.

675 000 FEET



675 000 FEET

670 000 FEET

5000 Feet

1 Kilometer

Scale - 1:20000

(Joins sheet 42)

670 000 FEET

Coordinate grid ticks and land division corners, if shown, are approximately positioned.  
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



(Joins sheet 41)

R. 5 W. | R. 4 W.

670 000 FEET



5 000 Feet

1 Kilometer

Scale - 1:20000

0

1 000

2 000

3 000

4 000

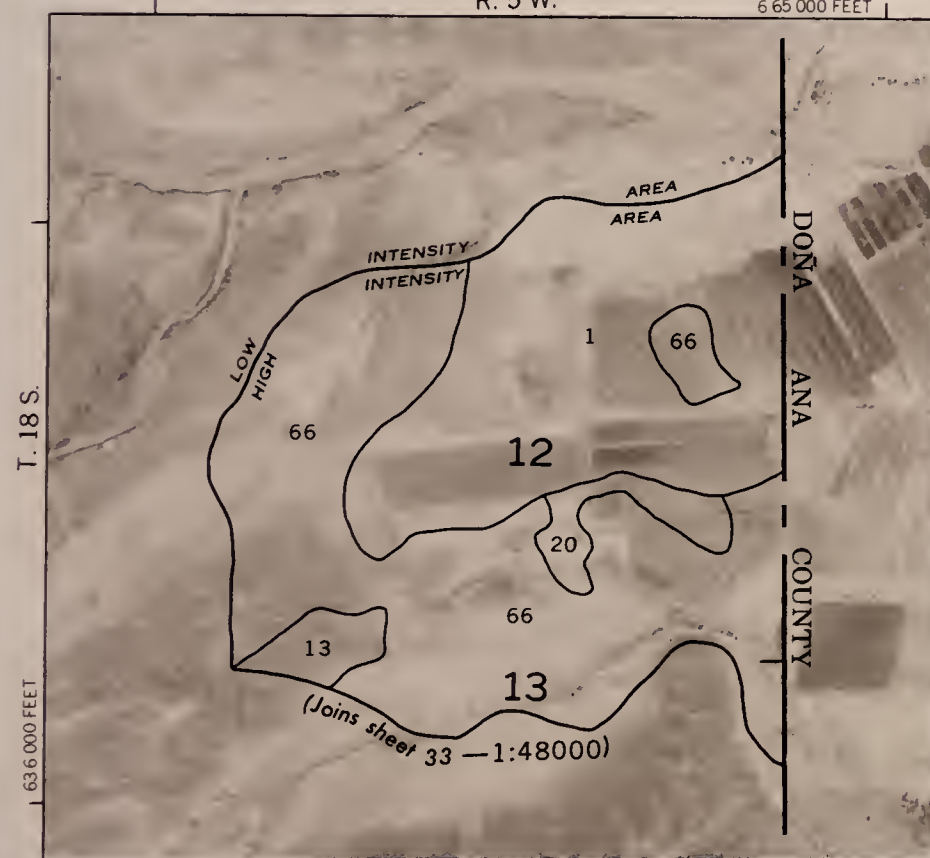
5 000

650 000 FEET

INSET A  
R. 5 W.

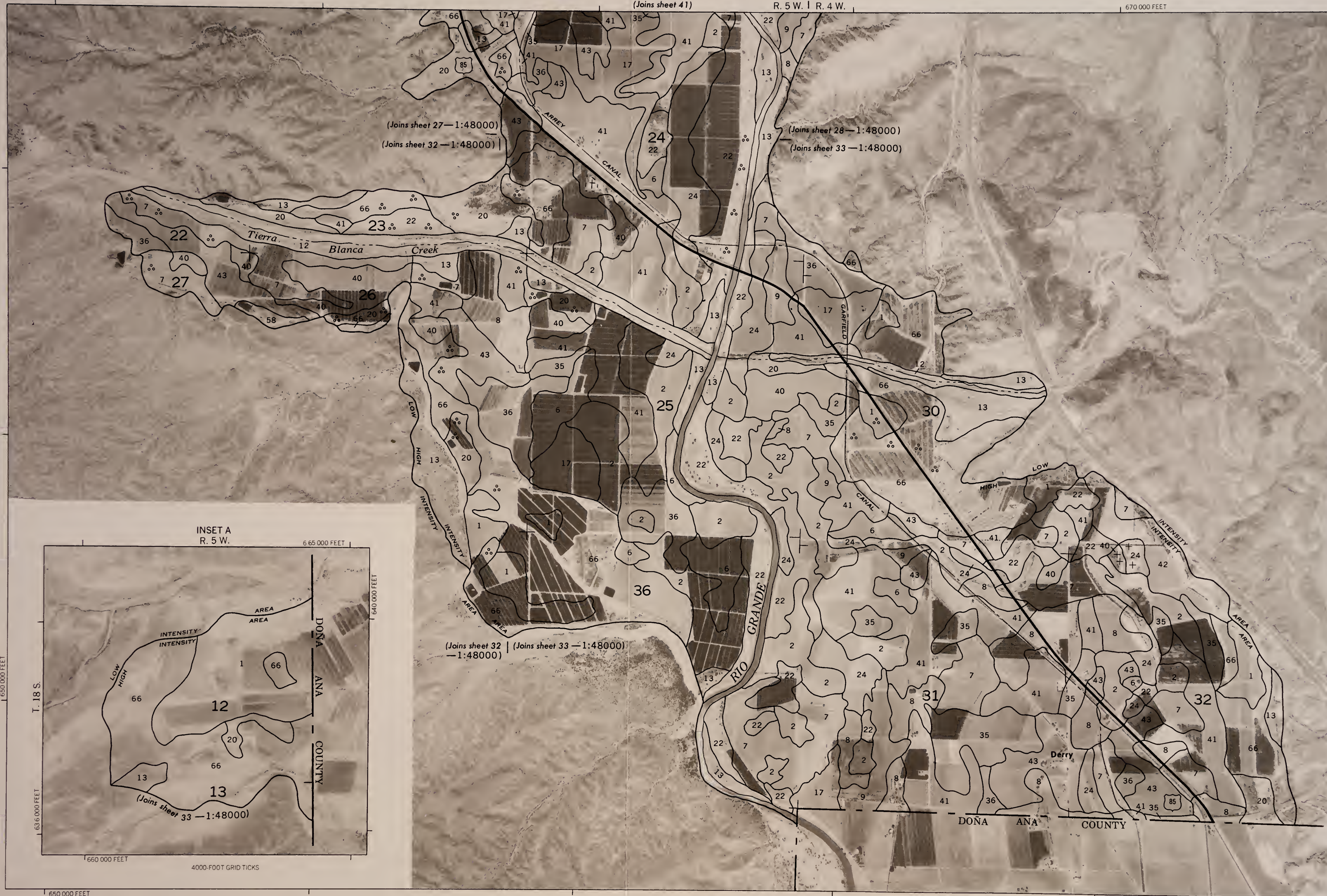
665 000 FEET

640 000 FEET



4000-FOOT GRID TICS

650 000 FEET



T. 17 S.

660 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are controlled photomosaics prepared from 13/4 aerial photography.







